EXHIBIT 100

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 1
 2                  UNITED STATES DISTRICT COURT
 3                NORTHERN DISTRICT OF CALIFORNIA
 4                  SAN FRANCISCO DIVISION
 5

 6      ------------------------------------x
 7      RICHARD KADREY, et al.,
 8      Individual and Representative,
 9                    Plaintiffs,
10           v.                         Case No.
11      META PLATFORMS, INC.,        3:23-cv-03417-VC
12      a Delaware corporation,
13                    Defendant.
14      ------------------------------------x
15

16        HIGHLY CONFIDENTIAL - ATTORNEYS' EYES ONLY
17              PURSUANT TO PROTECTIVE ORDER
18

19              VIDEOTAPED DEPOSITION of
20               DAVID CHOFFNES, Ph.D.
21              Boston, Massachusetts
22

23

24      Reporter: Michael D. O'Connor, RMR, CRR, CRC
25      Job No. 7281431
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Page 1

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7   Friday, March 28, 2025

8   9:34 a.m.

9

10   HIGHLY CONFIDENTIAL - ATTORNEYS' EYES ONLY

11   PURSUANT TO PROTECTIVE ORDER

12

13   VIDEOTAPED DEPOSITION of DAVID

14   CHOFFNES, Ph.D., held at Cooley LLP, 50

15   Boylston Street, Boston, Massachusetts,

16   pursuant to notice, before Michael D.

17   O'Connor, Registered Merit Reporter,

18   Certified Realtime Reporter, Certified

19   Realtime Captioner.

20

21

22

23

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25

```
 1      A P P E A R A N C E S:

 2

 3      ATTORNEYS FOR PLAINTIFFS:

 4          BOIES SCHILLER & FLEXNER LLP

 5          44 Montgomery Street

 6          San Francisco, California 94104

 7          (415) 293-6800

 8          BY:    JOSHUA STEIN, ESQ.

 9                 jstein@bsfllp.com

10

11      ATTORNEYS FOR DEFENDANT:

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15          (650) 843-5000

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19          COOLEY LLP

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22          (202) 842-7800

23          Washington, D.C. 20004

24          BY:    PHILLIP MORTON, ESQ.

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```

Page 3

1   A P P E A R A N C E S (Cont'd):

2

3   Also Present: Deane Carstensen, Videographer

4   Kyanna Sabanoglu, Esq.,

5   Meta Platforms, Inc.

6   Michelle Woodhouse, Esq.,

7   Meta Platforms, Inc.

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Page 4

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 1                        I N D E X

 2       Deposition of:                         Page

 3       DAVID R. CHOFFNES, Ph.D.

 4          By Mr. Weinstein                 8, 142

 5          By Mr. Stein                        125

 6

 7                     E X H I B I T S

 8       No.                                    Page

 9       Exhibit 1   Rebuttal Report of David R.

10                   Choffnes, Ph.D., February

11                   26, 2025                     12

12       Exhibit 2   BEP_0055                     53

13       Exhibit 3   Opening Expert Report of

14                   Dr. Jonathan L. Krein        66

15       Exhibit 4   File listings               100

16       Exhibit 5   Rebuttal Expert of Barbara

17                   Frederiksen-Cross           111

18       Exhibit 6   Document entitled,

19                   "Meta_Kadrey_00237238"      130

20       Exhibit 7   Document re: Uploaded and

21                   downloaded data             136

22

23

24

25
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1	P R O C E E D I N G S	
2		
3	THE VIDEOGRAPHER: Good morning.	
4	We are going on the record at 9:34 a.m.	09:34:50
5	on March 28, 2025. Please note that the	09:34:55
6	microphones are sensitive and they may	09:34:59
7	pick up whispering and private	09:35:02
8	conversations. Please mute your phones	09:35:04
9	at this time. Audio and video recording	09:35:07
10	will continue to take place unless all	09:35:07
11	parties agree to go off the record.	09:35:09
12	This is media unit one of the	09:35:10
13	video recorded deposition of Dr. David	09:35:12
14	Choffnes taken by counsel for Defendant	09:35:15
15	in the matter of Richard Kadrey, et al.	09:35:19
16	Individual and Representative Plaintiffs	09:35:23
17	versus Meta Platforms, Inc., a Delaware	09:35:25
18	corporation, filed in the United States	09:35:28
19	District Court, Northern District of	09:35:30
20	California, San Francisco Division, case	09:35:31
21	number 3:23-cv-03417-VC.	09:35:34
22	The location of this deposition is	09:35:39
23	Cooley LLP, 500 Boylston Street, Boston,	09:35:41
24	Massachusetts.	09:35:44
25	My name is Deane Carstensen	09:35:46

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1	representing Veritext. I'm the	09:35:47
2	videographer today. I'm not authorized	09:35:49
3	to administer an oath. I'm not related	09:35:51
4	to any party in this action nor am I	09:35:53
5	financially interested in the outcome.	09:35:55
6	If there are any objections to	09:35:57
7	proceeding, please state them at the	09:35:58
8	time of your appearance.	09:35:59
9	Counsel and all present including	09:36:00
10	remotely please now state your	09:36:00
11	appearance and affiliation for the	09:36:04
12	record.	09:36:04
13	MR. WEINSTEIN: This is Mark	09:36:06
14	Weinstein with the law firm of Cooley	09:36:08
15	LLP, here for the Defendant. I'll note	09:36:10
16	on the video, Michelle Woodhouse and	09:36:13
17	Kyanna Sabanoglu is here for Meta.	09:36:20
18	They're also in-house lawyers.	09:36:21
19	MR. MORTON: Phillip Morton from	09:36:24
20	Cooley is in person here in Boston.	09:36:25
21	MR. STEIN: Joshua Michelangelo	09:36:28
22	Stein, Boies Schiller & Flexner, LLP for	09:36:33
23	Plaintiffs.	09:36:38
24	THE VIDEOGRAPHER: Thank you	09:36:38
25	everyone. Would our court reporter	09:36:38

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1	please introduce himself and swear in	09:36:38
2	the witness, and we may proceed.	09:36:38
3	COURT REPORTER: Michael O'Connor,	09:36:43
4	the court reporter.	09:36:45
5		
6	DAVID R. CHOFFNES, Ph.D.	
7		
8	having been satisfactorily identified by the	
9	production of his driver's license, and duly	
10	sworn by the Notary Public, was examined and	
11	testified as follows:	
12		
13	EXAMINATION BY	
14	MR. WEINSTEIN:	09:36:54
15	Q. Good morning, sir.	09:36:54
16	A. Good morning.	09:37:08
17	Q. Could you state your name for the	09:37:08
18	record.	09:37:10
19	A. My name is David Choffnes.	09:37:10
20	Q. And how do you prefer to be	09:37:13
21	addressed; as Dr. Choffnes?	09:37:18
22	A. That works for me.	09:37:22
23	Q. Okay. And, Dr. Choffnes, you have	09:37:23
24	been retained as an expert witness in this	09:37:26
25	case, correct?	09:37:29

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1	A. Correct.	09:37:30
2	Q. When were you first retained in	09:37:30
3	this case?	09:37:34
4	A. When was I first retained? I	09:37:34
5	don't have the exact date off the top of my	09:37:38
6	mind. It was within the past two months, I	09:37:40
7	think.	09:37:45
8	Q. Okay. When were you first	09:37:45
9	contacted by anybody in connection with this	09:37:49
10	case?	09:37:51
11	A. I'm sorry, I don't have the e-mail	09:37:51
12	in front of me right now. I would have a	09:37:54
13	record of that in my inbox, but again, it was	09:37:55
14	-- I'm reasonably certain it's within the past	09:38:01
15	three months.	09:38:04
16	Q. Would it have been in 2025 or late	09:38:04
17	2024?	09:38:08
18	A. I could check my e-mail, but I'd	09:38:09
19	have to pull up my phone to do that.	09:38:12
20	Q. Understood. Dr. Choffnes,	09:38:13
21	obviously you're aware that this is a	09:38:17
22	deposition and you're under oath, correct?	09:38:18
23	A. Yes.	09:38:20
24	Q. And I gather from your report it	09:38:20
25	doesn't look like you have been deposed before	09:38:23

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1	in a lawsuit, correct?	09:38:25
2	A. Correct. This is my first time.	09:38:27
3	Q. Okay. So I'm going to give you	09:38:29
4	the speech that you'll probably hear in every	09:38:32
5	deposition you'll ever attend in your career as	09:38:34
6	an expert.	09:38:36
7	This is a deposition. You're	09:38:37
8	under oath. So you understand everything you	09:38:39
9	say here today has the same force and effect as	09:38:40
10	if it were stated in an open court, correct?	09:38:43
11	A. Correct.	09:38:45
12	Q. If there's a question you don't	09:38:46
13	understand, you can be free to ask for a	09:38:49
14	clarification. Otherwise, I have to assume you	09:38:51
15	understand my question.	09:38:53
16	Make sense?	09:38:54
17	A. Understood.	09:38:55
18	Q. Are you taking any medication,	09:38:56
19	Dr. Choffnes, that could affect the testimony	09:38:58
20	you're giving here today?	09:39:01
21	A. No, I'm not.	09:39:02
22	Q. Is there any reason, health or	09:39:02
23	otherwise, that you can come up with that you	09:39:04
24	can't give your best and most accurate	09:39:07
25	testimony here today?	09:39:09

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1	A. No.	09:39:09
2	Q. Now, Dr. Choffnes, this is your	09:39:10
3	first deposition, but from your report, I	09:39:19
4	believe you indicated that you have given	09:39:22
5	testimony in a confidential arbitration?	09:39:24
6	A. That's correct.	09:39:26
7	Q. Other than this confidential	09:39:27
8	arbitration, have you given testimony in any	09:39:30
9	other proceeding?	09:39:32
10	A. No.	09:39:33
11	Q. And by "testimony," I'm obviously	09:39:33
12	talking about giving oral testimony as today,	09:39:41
13	correct?	09:39:45
14	A. Correct.	09:39:45
15	Q. You have, however, filed	09:39:47
16	declarations in civil matters, correct?	09:39:49
17	A. Correct.	09:39:52
18	Q. And those declarations were	09:39:53
19	affidavits under penalty of perjury, correct?	09:39:59
20	A. Correct.	09:40:01
21	Q. You say in your report you have	09:40:01
22	been providing consulting services to the legal	09:40:08
23	industry for about five years. Let me give an	09:40:10
24	opportunity to mark as Exhibit 1 a copy of your	09:40:13
25	expert report. It's entitled "Rebuttal Report	09:40:15

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1	of David R. Choffnes, Ph.D., February 26,	09:40:19
2	2025," which you should have in front of you,	09:40:24
3	marked as Exhibit 1.	09:40:26
4	(Document marked as Exhibit 1	09:40:27
5	for identification)	09:40:27
6	Q. Let me know when you have that.	09:40:27
7	A. I have it.	09:40:29
8	Q. Okay. Dr. Choffnes, we're going	09:40:30
9	to be going through paragraphs of your report,	09:40:34
10	and asking you certain questions about the	09:40:37
11	opinions stated therein.	09:40:39
12	A. Okay.	09:40:41
13	Q. One caveat I always give is that	09:40:41
14	when I depose an expert, I don't preclude them	09:40:43
15	from looking at other parts of the report they	09:40:47
16	need to answer the question fully. So if you	09:40:49
17	need to refer to other portions of your report,	09:40:51
18	it's okay to do so.	09:40:53
19	Understood?	09:40:54
20	A. Okay.	09:40:54
21	Q. Now, in Paragraph 1 of your	09:41:02
22	report, Exhibit 1, you mention you have been	09:41:03
23	providing consulting services to the legal	09:41:09
24	industry for about five years, correct?	09:41:12
25	A. Correct.	09:41:13

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1	Q. That's accurate, correct?	09:41:15
2	A. At the time I wrote it, yes. It's	09:41:16
3	still five years, about five years.	09:41:19
4	Q. Thank you, sir.	09:41:22
5	Now, when you say the legal	09:41:24
6	industry, what are you referring to by that?	09:41:26
7	A. I mean my clients are lawyers	09:41:27
8	engaged in either active lawsuits or are	09:41:32
9	preparing or considering to file lawsuits.	09:41:37
10	Q. Okay. The ambiguity was, you're	09:41:40
11	not helping law firms make their computer	09:41:46
12	systems more efficient, correct?	09:41:48
13	A. Correct. My services are in the	09:41:50
14	expert capacity.	09:41:51
15	Q. Understood. Expert capacity in	09:41:52
16	support of, for example, lawsuits, correct?	09:41:55
17	A. Correct.	09:41:58
18	Q. Other than provide consulting	09:41:59
19	services in connection with lawsuits, what	09:42:00
20	other consulting services do you provide to the	09:42:03
21	legal industry, if any?	09:42:06
22	A. No other services.	09:42:08
23	Q. Okay. And I know you haven't been	09:42:09
24	designated as an expert to testify in anything	09:42:16
25	other than the confidential arbitration,	09:42:19

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1	correct?	09:42:21
2	A. Correct.	09:42:23
3	Q. And then did the arbitration	09:42:23
4	relate in any way to the BitTorrent protocol?	09:42:27
5	A. I did not.	09:42:31
6	Q. I don't want to get into any	09:42:33
7	information that you may not be allowed to	09:42:34
8	disclose about it, but can you give me sort of	09:42:36
9	a 10,000-foot view of what the arbitration was	09:42:38
10	about?	09:42:41
11	A. Sure. It was about information	09:42:41
12	collected about patients by a hospital website	09:42:48
13	and transmitted to third parties.	09:42:51
14	Q. Did this arbitration have anything	09:42:53
15	to do with Meta?	09:42:55
16	A. Meta was not the Defendant.	09:42:58
17	Q. Okay. Was Meta involved in this	09:43:01
18	arbitration in any way?	09:43:08
19	A. Meta was a third party.	09:43:08
20	Q. What was Meta accused of doing or	09:43:13
21	not doing?	09:43:26
22	A. Receiving data, patient data.	09:43:26
23	Q. Did this arbitration come to a	09:43:30
24	conclusion?	09:43:43
25	A. My client did not follow up with	09:43:44

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1	me.	09:43:46
2	Q. Okay. So you don't know if it was	09:43:46
3	settled or how it was resolved?	09:43:50
4	A. Correct.	09:43:52
5	Q. When did you provide this	09:43:53
6	testimony in this confidential arbitration?	09:43:56
7	A. Last summer.	09:43:58
8	Q. Who was the Defendant in that	09:43:59
9	case?	09:44:04
10	A. I don't think I'm at liberty to	09:44:04
11	say.	09:44:07
12	Q. Was Meta accused of any wrongdoing	09:44:07
13	in accordance with that suit?	09:44:14
14	A. No.	09:44:16
15	Q. So it was involved to the extent	09:44:16
16	it was receiving patient data, but there was no	09:44:22
17	allegation it did anything with that data?	09:44:24
18	A. I believe that's correct. The	09:44:26
19	focus was on the hospital.	09:44:29
20	Q. Okay. So you have not provided	09:44:31
21	any testimony prior to this case related to the	09:44:43
22	BitTorrent protocol, correct?	09:44:48
23	A. Correct.	09:44:51
24	Q. In terms of the consulting	09:44:52
25	services you provide to the legal industry for	09:45:08

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1	the past five years, approximately how many	09:45:10
2	lawsuits have you provided assistance to?	09:45:13
3	MR. STEIN: Object as to form.	09:45:18
4	A. I'd say if I had -- so I don't	09:45:20
5	have an exact number off the top of my head,	09:45:25
6	but I'd say it's approximately ten.	09:45:27
7	Q. Thank you, sir. When you were	09:45:30
8	retained in connection with this case, did	09:45:38
9	somebody from the Plaintiff reach out to you?	09:45:41
10	A. Josh Stein reached out to me.	09:45:43
11	Q. Okay. You say in your declaration	09:45:47
12	that you're being compensated at a rate of $600	09:45:56
13	per hour for your work and a thousand dollars	09:45:58
14	per hour for deposition testimony.	09:46:01
15	Is that still correct?	09:46:04
16	A. That's correct.	09:46:05
17	Q. Approximately how many hours would	09:46:05
18	you estimate have you put into the work you've	09:46:11
19	provided in this case?	09:46:13
20	A. I'd say at this point it's	09:46:13
21	probably close to 40.	09:46:17
22	Q. And that includes the time you	09:46:19
23	spent working on your report as well as	09:46:25
24	preparing for the deposition here today?	09:46:27
25	A. Correct.	09:46:29

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1	Q. Okay. Now, as far as the	09:46:30
2	deposition today, can you describe generally	09:46:32
3	what you did to prepare for that deposition?	09:46:35
4	A. I reviewed the documents that I	09:46:38
5	disclosed that I had reviewed, focusing mainly	09:46:42
6	on the reports. Also went over with my clients	09:46:46
7	how a deposition would go.	09:46:57
8	Q. Understood. Now, this is not the	09:46:58
9	first expert report you've submitted in	09:47:11
10	connection with litigation, correct?	09:47:13
11	A. Correct. The arbitration also had	09:47:15
12	a report.	09:47:21
13	Q. Okay. And then the other cases	09:47:22
14	you submitted declarations, but do you know if	09:47:26
15	you actually served a formal expert report?	09:47:29
16	A. To the best of my knowledge, not	09:47:35
17	yet, no other reports.	09:47:37
18	Q. Understood. Dr. Choffnes, you	09:47:39
19	obviously consider yourself an expert on the	09:47:41
20	BitTorrent protocol, correct?	09:47:43
21	A. Correct.	09:47:44
22	Q. When is the first time that you	09:47:45
23	used the BitTorrent protocol?	09:47:47
24	A. Probably 2003.	09:47:49
25	Q. And you obtained your Ph.D. thesis	09:47:52

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1	in 2010, correct?	09:47:57
2	A. Correct.	09:47:58
3	Q. And one of the topics of your	09:47:59
4	Ph.D. thesis related to implementations of	09:48:01
5	BitTorrent protocol, correct?	09:48:06
6	A. Not exactly.	09:48:07
7	Q. Okay. You said in Paragraph 1,	09:48:12
8	you said "building computer systems on top of	09:48:16
9	BitTorrent." Is that correct?	09:48:21
10	A. Correct.	09:48:25
11	Q. Let's go back to 2003. What were	09:48:26
12	the circumstances in which you were first	09:48:29
13	introduced to the BitTorrent protocol?	09:48:31
14	A. My roommate identified it as an	09:48:32
15	interesting way to download files.	09:48:35
16	Q. Now, BitTorrent was developed in	09:48:36
17	the early 2000s. I gather from the time period	09:48:46
18	that you weren't involved in the design of the	09:48:48
19	initial BitTorrent protocol, correct?	09:48:50
20	A. Correct.	09:48:52
21	Q. Are there any aspects of the	09:48:53
22	BitTorrent protocol as exist today that you	09:48:54
23	were responsible for the design, if any?	09:48:57
24	A. I would say no.	09:49:01
25	Q. Okay. And you mentioned in 2003	09:49:02

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1	your roommate identified as an interesting way	09:49:09
2	to download files. At the time, were those	09:49:14
3	music files?	09:49:16
4	A. Music files were likely included	09:49:17
5	in that, yes.	09:49:19
6	Q. Now, when was the first time that	09:49:20
7	you studied the BitTorrent protocol in	09:49:25
8	connection with any of your work, including	09:49:27
9	your work as a student or researcher?	09:49:30
10	A. From the research perspective, the	09:49:32
11	first time was around the 2006, 2007 timeframe.	09:49:36
12	Q. And what was the context of your	09:49:42
13	research in that timeframe?	09:49:51
14	A. So the research team that I worked	09:49:52
15	with had identified a way to find whether	09:50:00
16	Nhosts on the internet were relatively close or	09:50:06
17	relatively far away.	09:50:09
18	We realized that being able to	09:50:11
19	officially identify hosts that are nearby would	09:50:13
20	give you an ability to find hosts that can --	09:50:16
21	you can exchange data with faster, because	09:50:19
22	proximity usually leads to faster data	09:50:22
23	exchanges.	09:50:26
24	That insight led to the idea to	09:50:29
25	create software that extends, or in this case	09:50:32

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1	modifies the default behavior of BitTorrent, to	09:50:35
2	bias some of the connections that are made	09:50:40
3	toward hosts that are relatively nearby to try	09:50:42
4	and improve performance.	09:50:46
5	Q. In connection with that research,	09:50:52
6	how did you determine whether a host was in	09:50:54
7	close proximity or not?	09:50:58
8	A. So the technique that we came up	09:50:59
9	with was the observation that content delivery	09:51:03
10	networks, and specifically Akamai, sends --	09:51:08
11	when we visit websites, they send you to	09:51:13
12	servers that are relatively close by, and so	09:51:16
13	our observation is that if two different hosts	09:51:19
14	on the internet are sent to the same servers,	09:51:22
15	they're not only likely close to those servers,	09:51:25
16	because that's what Akamai is trying to do, but	09:51:27
17	they are also as a result probably close to	09:51:32
18	each other.	09:51:34
19	Akamai figures this out because	09:51:34
20	they do extensive network measurements, and	09:51:36
21	then we leverage those measurements that they	09:51:39
22	sort of reveal some part of through the servers	09:51:42
23	they select to send you to. So we leverage	09:51:44
24	that information to find hosts that are close	09:51:47
25	to each other without having to do all the	09:51:49

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1	measurements.	09:51:51
2	Q. Understood. Thank you, sir.	09:51:52
3	Did this research you did in the	09:51:56
4	2006, 2007 timeframe, did it result in any	09:51:58
5	publication of any papers?	09:52:03
6	A. Yes. There was the 2008 paper in	09:52:05
7	is in SIGCOMM, which is the flagship	09:52:08
8	publication in computer science for computer	09:52:10
9	networking.	09:52:10
10	Q. And that's an ACM publication?	09:52:11
11	A. Correct. Association of Computing	09:52:16
12	Machinery.	09:52:20
13	Q. Understood. Did that research	09:52:20
14	result in any changes to the BitTorrent	09:52:29
15	protocols that you're aware of?	09:52:33
16	A. I don't believe it led to changes.	09:52:33
17	Our software was provided as an extension. So	09:52:35
18	it meant that people could install it and it	09:52:39
19	could change the way that the default	09:52:41
20	BitTorrent behavior was, but it didn't actually	09:52:42
21	change the protocol itself.	09:52:45
22	Q. Is it still in use today, the	09:52:46
23	extension?	09:52:55
24	A. That is hard for me to say,	09:52:57
25	because I don't -- I haven't maintained it for	09:52:59

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1	a number of years. I would guess that it is	09:53:01
2	unlikely that it's still in use today, because	09:53:04
3	simply of the fact that I have not maintained	09:53:08
4	it and it's probably not compatible with many	09:53:10
5	clients anymore.	09:53:12
6	Q. Understood. So during this time	09:53:13
7	period -- so that would have been after you got	09:53:21
8	your Master's and before you got your Ph.D.,	09:53:22
9	correct?	09:53:26
10	A. Correct.	09:53:26
11	Q. -- what was the next set of	09:53:27
12	research that you did relating to the	09:53:29
13	BitTorrent protocol?	09:53:31
14	A. The chronology is a little hard	09:53:31
15	for me to -- there were several relevant	09:53:41
16	publications that came out around the same	09:53:45
17	time, so I don't know exactly when each project	09:53:47
18	started.	09:53:49
19	But one example publication, which	09:53:50
20	became my thesis work, is that by monitoring	09:53:54
21	the network performance from BitTorrent	09:54:00
22	clients, you can tell when network failures	09:54:04
23	happen.	09:54:06
24	When multiple BitTorrent clients	09:54:07
25	see network performance problems at the same	09:54:08

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1	time, it's more likely to be due to a network	09:54:11
2	outage or other network performance issue as	09:54:14
3	opposed to just random chance.	09:54:17
4	Q. Understood. Do you use BitTorrent	09:54:19
5	in connection with any of your research?	09:54:24
6	A. Not today.	09:54:26
7	Q. In the past have you?	09:54:27
8	A. My research on BitTorrent ended	09:54:30
9	reasonably shortly after my Ph.D. At that	09:54:36
10	point I switched to other topics.	09:54:39
11	Q. Okay. So have you been actively	09:54:40
12	researching BitTorrent since 2010?	09:54:44
13	A. No. I mean, there were some	09:54:47
14	publications that came later that were built on	09:54:51
15	top of BitTorrent, so there was some minimal	09:54:53
16	involvement, and then not any more after that.	09:54:56
17	Q. Okay. What are some of the	09:55:00
18	reasons that, in your professional experience,	09:55:09
19	people use the BitTorrent protocol?	09:55:12
20	MR. STEIN: Object as to form.	09:55:14
21	A. We've observed from the data that	09:55:15
22	we have that people use it for files that are	09:55:22
23	commonly the size of TV shows, movies, music,	09:55:26
24	and the like.	09:55:30
25	Q. Understood. So I gather by your	09:55:31

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1	description that it is used for the transfer of	09:55:37
2	very large files?	09:55:39
3	A. It is typically used for large	09:55:40
4	files, yes.	09:55:44
5	Q. Does BitTorrent have any	09:55:44
6	advantages in the transfer of very large files	09:55:48
7	over, for example, directly downloading files	09:55:51
8	from a website?	09:55:54
9	MR. STEIN: Object as to form.	09:55:55
10	A. So there's a number of different	09:55:57
11	reasons you might use BitTorrent over a	09:56:03
12	website. So website may have limited capacity	09:56:06
13	to provide bandwidth, and so that would cause	09:56:09
14	slow downloads.	09:56:14
15	Whereas, with BitTorrent, you	09:56:14
16	could potentially download from multiple	09:56:16
17	different Nhosts at the same time, and that	09:56:19
18	would increase your capacity.	09:56:22
19	The other reason might be that you	09:56:22
20	have some data and you do not have a way to	09:56:26
21	host it online on a website, in which case	09:56:29
22	BitTorrent is a way to get around needing to	09:56:32
23	host, because peers can share it with each	09:56:35
24	other.	09:56:38
25	Q. So you talked about the website	09:56:38

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1	may have limited capacity to provide bandwidth.	09:56:47
2	Could you expand on that a little bit more?	09:56:51
3	A. Sure. I've certainly seen	09:56:53
4	examples where a website may give you a fixed	09:56:55
5	amount of bandwidth.	09:57:00
6	Just to throw out some numbers for	09:57:02
7	just this example, let's say, you could get a	09:57:05
8	hundred kilobytes per second from a website,	09:57:09
9	and by comparison with a collection of peers,	09:57:12
10	you might be able to get a megabyte per second.	09:57:14
11	So that's the kind of thing that I'm talking	09:57:22
12	about.	09:57:24
13	Q. Understood. Can it also provide	09:57:26
14	-- withdrawn.	09:57:34
15	Are there any differences in terms	09:57:34
16	of reliability between the downloads via	09:57:36
17	BitTorrent versus the download from, for	09:57:39
18	example, a dedicated website?	09:57:41
19	MR. STEIN: Object as to form.	09:57:44
20	A. There's not a general way to speak	09:57:45
21	about the relative reliability of the two.	09:57:48
22	Q. I understand. But you would agree	09:57:50
23	that downloading from a website does present a	09:57:54
24	single point of failure, correct?	09:57:57
25	A. No.	09:57:59

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1	Q. Well, if the website goes down,	09:58:01
2	are you able to download the file?	09:58:03
3	A. It depends on how the website is	09:58:04
4	configured. Most websites are hosted with	09:58:06
5	multiple replicas these days.	09:58:09
6	Q. Okay. Well, if the replicas go	09:58:12
7	down, obviously the ability to download the	09:58:14
8	files is compromised, correct?	09:58:16
9	A. If all of the replicas go down,	09:58:18
10	that is true. But the companies that I	09:58:18
11	mentioned before, like Akamai or Cloudflare,	09:58:18
12	have tens or hundreds of thousands of servers	09:58:30
13	around the world in that they very rarely	09:58:30
14	become fully unavailable.	09:58:33
15	Q. Okay. Dr. Choffnes, before we get	09:58:34
16	into BitTorrent, I want to sort of go through a	09:58:40
17	couple of terms that are mentioned in your	09:58:44
18	report, and sort of get a level set of what we	09:58:46
19	mean by these terms before we start introducing	09:58:50
20	them.	09:58:52
21	The term "seeding" as it relates	09:58:52
22	to BitTorrent, what's your understanding as to	09:59:00
23	what that refers to?	09:59:03
24	A. Just to clarify, you said seed; is	09:59:04
25	that right, s-e-e-d?	09:59:06

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1	Q. S-e-e-d-i-n-g.	09:59:06
2	A. Yeah. The way I use "seeding"	09:59:09
3	refers to a situation where a peer is connected	09:59:11
4	to a torrent, has all of the data corresponding	09:59:13
5	to that torrent, which is to say all the data	09:59:16
6	from all of the pieces, and while participating	09:59:19
7	in the swarm as a seed is uploading data to	09:59:22
8	other peers exclusively. It is no longer	09:59:26
9	downloading, because it doesn't need to.	09:59:28
10	Q. Understood. So the term "seed"	09:59:29
11	refers to a peer that has fully downloaded a	09:59:33
12	particular torrent, correct?	09:59:37
13	A. Correct, and is still connected to	09:59:38
14	it, meaning it's still making it available.	09:59:40
15	Q. Understood. You probably can	09:59:43
16	anticipate my next question. The term	09:59:50
17	leeching, l-e-e-c-h-i-n-g, what does that refer	09:59:53
18	to in the context of BitTorrent?	09:59:56
19	A. In BitTorrent this refers to a	09:59:57
20	peer that does not have all of the pieces of	09:59:59
21	the data corresponding to the torrent file. In	10:00:02
22	that scenario, leechers are downloading, any	10:00:05
23	piece that they are able to get that they don't	10:00:11
24	yet have from another peer, and as part of the	10:00:14
25	standard protocol, are also likely uploading	10:00:18

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1	data to other peers as part of the protocol	10:00:22
2	that gives them a higher chance of continuing	10:00:26
3	to be able to download from that peer, if you	10:00:31
4	upload to them as well.	10:00:35
5	Q. Unlike a seeder, a leecher is	10:00:36
6	somebody who is still in the process of	10:00:51
7	downloading the torrent, correct?	10:00:53
8	A. Correct.	10:00:54
9	Q. Now, after someone becomes a	10:00:55
10	seeder, meaning they have downloaded all of the	10:00:58
11	portions of a torrent, are they required to	10:01:02
12	stay on the network and provide that data to	10:01:05
13	other users?	10:01:07
14	A. No, they're not required.	10:01:15
15	Q. So the seeder can disconnect from	10:01:16
16	the network at the point in which the download	10:01:19
17	is complete, and that would prevent the data	10:01:21
18	from being uploaded to other users, correct?	10:01:23
19	MR. STEIN: Object as to form.	10:01:27
20	A. As a seed, not speaking to the	10:01:28
21	fact that they are still uploading while they	10:01:35
22	are leeching, it is true that once they become	10:01:38
23	a seed, if they leave the swarm, so they stop	10:01:42
24	seeding, then they are no longer uploading to	10:01:46
25	other peers.	10:01:48

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1	Q. Understood. Then another term	10:01:52
2	that is used in your report is "peer." In the	10:01:54
3	context of BitTorrent, does that refer to	10:01:57
4	either a seeder or a leecher?	10:02:00
5	A. Correct.	10:02:04
6	Q. And then I think you mentioned the	10:02:05
7	word "swarm," s-w-a-r-m. What is swarm as it	10:02:08
8	relates to BitTorrent?	10:02:13
9	A. In a BitTorrent, the swarm is the	10:02:15
10	set of all peers that are connected to the	10:02:17
11	torrent, which means they're actively	10:02:19
12	participating in uploading and/or downloading	10:02:21
13	of content corresponding to that torrent file.	10:02:24
14	Q. Okay. Which brings me to the next	10:02:29
15	question. So a swarm in BitTorrent relates to	10:02:35
16	a series of peers that are interested or	10:02:38
17	uploaded or downloading a particular torrent,	10:02:41
18	correct?	10:02:43
19	A. Correct. And I was a little loose	10:02:44
20	when I mean torrent, I mean the data associated	10:02:47
21	with the torrent file. The torrent file	10:02:49
22	describes what that data is.	10:02:52
23	Q. Right. I was going to get to	10:02:53
24	that, because there is a .torrent file that	10:02:55
25	describes the data, and then there's the actual	10:02:58

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1	payload of the torrent, correct?	10:03:01
2	A. Yes. I would just clarify what	10:03:03
3	the word "payload" means in this case. I don't	10:03:07
4	know if you want me to do that now.	10:03:10
5	Q. Sure. I'm just trying to make	10:03:12
6	sure that when we refer to the torrent data,	10:03:13
7	we're referring to the actual portions of the	10:03:16
8	torrent being downloaded and not the actual	10:03:19
9	.torrent file?	10:03:26
10	A. Correct, yes. So the content	10:03:26
11	associated with the torrent file is the data	10:03:28
12	that you're aiming to download via the torrent	10:03:32
13	file. We can call that the payload.	10:03:35
14	Q. Okay. And then during the torrent	10:03:37
15	process for a particular torrent, does the	10:03:48
16	composition of the swarm change, in your	10:03:52
17	experience?	10:03:55
18	A. Could you explain what you mean by	10:03:56
19	the composition of the swarm?	10:04:02
20	Q. Who is present in the swarm, how	10:04:04
21	many leechers, how many seeders?	10:04:07
22	A. In general, it is true that the	10:04:09
23	set of seeders and peers changes over time.	10:04:12
24	Q. How frequently do they change or	10:04:15
25	does it depend on the torrent?	10:04:17

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1	A. It depends on a lot of factors.	10:04:18
2	It's not something I can speak generally about.	10:04:22
3	Q. Understood. And then another term	10:04:25
4	that is used in your report is the word	10:04:32
5	"piece," p-i-e-c-e. In the context of	10:04:37
6	BitTorrent, I know that the word "piece" in our	10:04:41
7	English has a well-understood meaning.	10:04:43
8	In the context of BitTorrent, what	10:04:45
9	is the piece?	10:04:47
10	A. So the way to understand the piece	10:04:47
11	is, first, given a payload, corresponding to a	10:04:52
12	torrent file, is of a certain size, typically	10:04:57
13	quite large. What BitTorrent does is breaks it	10:05:00
14	up into what it calls pieces, and those pieces	10:05:04
15	are smaller units of data that can be	10:05:07
16	downloaded separately, and when put together at	10:05:11
17	the end, gives you the entire payload.	10:05:14
18	Q. Generally speaking, does the size	10:05:17
19	of the piece vary from torrent to torrent?	10:05:37
20	A. It can. It's whoever makes the	10:05:39
21	torrent file can decide what the piece size it,	10:05:42
22	though it typically is one of a -- they're sort	10:05:46
23	of like somewhat standard sizes that are	10:05:51
24	typically chosen.	10:05:52
25	Q. What are those standard sizes?	10:05:53

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1	A. On the order of single-digit	10:05:55
2	megabytes historically.	10:05:57
3	Q. And if I'm trying to download a	10:06:00
4	torrent, I can get pieces from a number of	10:06:09
5	different peers in the swarm, correct?	10:06:13
6	A. Correct, subject to availability.	10:06:16
7	Q. Of course. Now, talking about	10:06:22
8	pieces, do BitTorrent clients exchange entire	10:06:33
9	pieces with each other?	10:06:42
10	A. They may. They may also exchange	10:06:43
11	-- the exchange that leads to a piece may also	10:06:51
12	be actually separate smaller subcomponents	10:06:53
13	called blocks that come together to make a	10:06:57
14	piece.	10:07:00
15	Q. Understood. That was my next	10:07:00
16	question. Just so I have a complete set of	10:07:02
17	terminology, in the context of BitTorrent, what	10:07:04
18	is a block?	10:07:07
19	A. A block is yet another smaller	10:07:08
20	subdivision of the payload, in this case,	10:07:10
21	again, to allow peers to be able to download	10:07:15
22	sub or smaller chunks of data, for lack of a	10:07:23
23	better term, that collectively can make up a	10:07:28
24	piece.	10:07:31
25	Q. Okay. So in the sort of Venn	10:07:31

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1	diagram, you have a complete torrent file, and	10:07:36
2	then you have pieces in that torrent file, and	10:07:39
3	within those pieces you have blocks, correct?	10:07:42
4	A. Correct.	10:07:46
5	Q. Is another word for block a	10:07:46
6	subpiece; is that another term that's used in	10:07:49
7	the BitTorrent lexicon?	10:07:51
8	A. I don't believe I've actually	10:07:53
9	heard the subpiece terminology, but I'm	10:07:54
10	familiar with blocks being used.	10:07:56
11	Q. Understood. What, in your	10:08:04
12	experience, is the size of blocks?	10:08:05
13	A. I think it's on the order of	10:08:06
14	kilobytes.	10:08:09
15	Q. Okay. And by kilobytes, you're	10:08:10
16	talking about thousands of bytes, correct?	10:08:18
17	A. One kilobyte is 1,024 bites.	10:08:21
18	Q. Right. So, for example, is a	10:08:27
19	typical size of a block 16 kilobytes?	10:08:30
20	A. I don't know what's typical	10:08:32
21	anymore, but it would not be surprising to see	10:08:34
22	a block of that size.	10:08:36
23	Q. Okay. And you said that pieces	10:08:40
24	are typically single-digit megabytes, correct?	10:08:46
25	A. Correct.	10:08:51

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1	Q. This is going to sound dumb, but a	10:08:51
2	megabyte is like 1,024 kilobytes, correct?	10:08:54
3	A. That is correct. It's not dumb.	10:08:59
4	Q. So a megabyte would be 1,024	10:09:01
5	multiplied by 1,024, correct?	10:09:04
6	A. That's correct. Everything in	10:09:06
7	computers is binary. Everything is a multiple	10:09:07
8	of two.	10:09:10
9	Q. Right. So within a piece, there	10:09:10
10	would be dozens or perhaps even hundreds of	10:09:27
11	blocks, correct?	10:09:31
12	A. Yeah, the exact number would	10:09:32
13	depend on the relative sizes of those two	10:09:35
14	entities, but ballpark that seems about right.	10:09:37
15	Q. Okay. In connection with the	10:09:43
16	research that you do, do you ever obtain data	10:10:02
17	that you're working with via BitTorrent?	10:10:05
18	A. Yes.	10:10:08
19	Q. What's the type of data that --	10:10:09
20	withdrawn.	10:10:12
21	Could you give me some examples in	10:10:13
22	connection with the research that you do of	10:10:26
23	obtaining data via BitTorrent?	10:10:30
24	A. Okay. So one example is operating	10:10:32
25	system software. So I will often, when I'm	10:10:40

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1	getting a Linux operating system distribution,	10:10:43
2	I will use BitTorrent for that. Just as an	10:10:50
3	example, a Ubuntu is what I would typically	10:10:54
4	use.	10:10:57
5	I've also used it for something	10:10:58
6	called MACTEX, which is typesetting software.	10:10:59
7	It's what a lot of what academics in computer	10:11:03
8	science use to build the text of our papers	10:11:05
9	into a nicely formatted document.	10:11:09
10	I've also used it to download the	10:11:12
11	English language version of Wikipedia to then	10:11:16
12	use as -- to set up a clone of Wikipedia to use	10:11:21
13	as an exercise in class.	10:11:26
14	Q. And you refer to MACTEX. Is that	10:11:28
15	M-A-C-T-E-X?	10:11:39
16	A. Yes. So these are open software.	10:11:42
17	Q. And the first example you said you	10:11:48
18	would use it for is downloading Linux	10:11:52
19	distributions, correct?	10:11:57
20	A. Correct.	10:11:57
21	Q. What is the reason you would use	10:11:58
22	BitTorrent to download Linux as opposed to,	10:12:03
23	say, downloading it from a website?	10:12:06
24	A. It tends to be faster over	10:12:08
25	BitTorrent, to be clear. It's faster over	10:12:15

1	BitTorrent, in case that was not clear.	10:12:17
2	Q. Okay. And then obviously Linux	10:12:19
3	distribution can be very large, correct?	10:12:21
4	MR. STEIN: Object as to form.	10:12:23
5	A. Linux distributions can be on the	10:12:25
6	order of single digit gigabytes.	10:12:30
7	Q. And in connection with MACTEX, how	10:12:33
8	is BitTorrent employed?	10:12:50
9	A. It's, again, sort of free open	10:12:52
10	source software. I believe the developer	10:12:59
11	community is all volunteers, so they don't have	10:13:01
12	a lot of money to pay for hosting. So one	10:13:03
13	efficient way to get the data is over	10:13:05
14	BitTorrent. And when you're setting it up for	10:13:08
15	the first time, there's just a lot of pieces of	10:13:14
16	the software that need to be downloaded.	10:13:16
17	In other words, it's on the order	10:13:21
18	of -- and this is where I don't remember off	10:13:23
19	the top of my head, but probably hundreds of	10:13:29
20	megabytes, or again, single-digit gigabytes.	10:13:32
21	So it's something that in this	10:13:32
22	case it's, again, sort of faster, more	10:13:34
23	efficient to download over BitTorrent than via	10:13:36
24	a website.	10:13:39
25	Q. Understood. So the data you're	10:13:40

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1	downloading via MACTEX would be the software	10:13:45
2	and associated data, correct?	10:13:46
3	A. Correct.	10:13:49
4	Q. And then the Linux distribution,	10:13:49
5	the data you're downloading via BitTorrent is	10:13:51
6	also the software and any associated data,	10:13:54
7	correct?	10:13:56
8	A. Correct.	10:13:56
9	Q. And then the other thing you said	10:14:03
10	you support was to download the English	10:14:05
11	language version of Wikipedia, correct?	10:14:08
12	A. Correct.	10:14:10
13	Q. Is that something you could	10:14:10
14	download from the Wikipedia website?	10:14:14
15	A. I don't remember off the top of my	10:14:18
16	head if they even have a direct download link	10:14:21
17	or if it was only if you have BitTorrent. It	10:14:25
18	has been a while since I downloaded it.	10:14:26
19	Q. Understood. But the English	10:14:29
20	language of BitTorrent, you're referring to the	10:14:33
21	entirety of the articles in the English	10:14:36
22	language?	10:14:40
23	MR. STEIN: Object as to form.	10:14:40
24	A. I think you misspoke, because you	10:14:42
25	said the English language version of	10:14:44

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1	BitTorrent.	10:14:46
2	Q. Correct. I will repeat. You're	10:14:46
3	absolutely correct. I misspoke.	10:14:48
4	The English language version of	10:14:50
5	Wikipedia, you're referring to the entirety of	10:14:52
6	its articles in the English language?	10:14:53
7	A. The text -- at the time I got it,	10:14:56
8	it was the entirety of the English language	10:14:58
9	text, not the other media.	10:15:01
10	Q. Understood. The other media,	10:15:04
11	would be, for example, images or perhaps sound	10:15:09
12	files that may be included in the articles,	10:15:12
13	correct?	10:15:15
14	A. Correct.	10:15:15
15	Q. How much data was the text	10:15:16
16	associated with the English language in	10:15:18
17	Wikipedia, if you recall?	10:15:22
18	A. I don't recall. It was also	10:15:22
19	probably on the order of gigabytes.	10:15:25
20	Q. Okay. And then so we just covered	10:15:28
21	three examples, your use of BitTorrent in your	10:15:32
22	work, the Linux distribution to MACTEX, and the	10:15:34
23	Wikipedia download.	10:15:38
24	Are there any other instances in	10:15:40
25	which you can use BitTorrent to download data	10:15:42

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1	in connection with your work that you can	10:15:44
2	recall?	10:15:45
3	A. I think they were all similar in	10:15:46
4	nature. There's been many instances of	10:15:53
5	different Linux be distributions over the years	10:15:56
6	that have been involved.	10:15:58
7	Q. Do any of the -- as a professor,	10:15:58
8	do you oversee the work of any students?	10:16:11
9	A. Yes. Are you referring	10:16:15
10	specifically to Ph.D. students or just in	10:16:19
11	general students?	10:16:22
12	Q. Well, that's a great	10:16:23
13	clarification. We'll start with Ph.D.	10:16:26
14	students.	10:16:29
15	A. I supervise Ph.D. students. My	10:16:29
16	seventh -- what's a better way to phrase this.	10:16:32
17	My seventh Ph.D. student to defend just	10:16:37
18	defended his dissertation earlier this week,	10:16:39
19	and I have one other current student and two	10:16:42
20	students that I've just admitted and will be	10:16:45
21	coming in the fall.	10:16:48
22	Q. Do any of the Ph.D. students that	10:16:48
23	you supervise, are they doing research relating	10:16:51
24	to the BitTorrent protocol that you're aware	10:16:54
25	of?	10:16:56

1	A. No.	10:16:56
2	Q. Okay. And do you know if they're	10:16:59
3	using BitTorrent to obtain data in connection	10:17:02
4	with any of the research?	10:17:05
5	A. I do not -- I'm not aware of any	10:17:06
6	use of BitTorrent for research by my students.	10:17:11
7	Q. Okay. Do you teach any courses	10:17:14
8	relating to BitTorrent?	10:17:19
9	A. Yes.	10:17:21
10	Q. Which ones?	10:17:21
11	A. So I teach two versions of the	10:17:22
12	computer networking class; one at the	10:17:25
13	undergraduate level and one at the Master's and	10:17:27
14	Ph.D. level. They have -- the names of the	10:17:31
15	courses have changed over time, but the	10:17:35
16	Master's one is called Fundamentals of Computer	10:17:37
17	Networking. The undergraduate one has	10:17:40
18	Networking in the title, but sometimes also has	10:17:44
19	Distributed Systems in the title.	10:17:47
20	Q. Is BitTorrent covered as an	10:17:54
21	example of a P to P protocol?	10:17:57
22	A. Yes.	10:17:59
23	Q. For the record, P to P refers to	10:17:59
24	peer to peer, correct?	10:18:03
25	A. That's correct.	10:18:04

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1	Q. And BitTorrent is one example of a	10:18:04
2	peer-to-peer protocol, correct?	10:18:07
3	A. Correct.	10:18:08
4	Q. Probably the most commonly known,	10:18:10
5	correct?	10:18:12
6	MR. STEIN: Object as to form.	10:18:18
7	A. I actually don't know. You'd be	10:18:18
8	surprised the kids these days what they do and	10:18:20
9	don't know about -- I'll leave it there.	10:18:23
10	Q. In your report, sir, you	10:18:24
11	referenced that you reviewed an expert report	10:18:50
12	of a gentleman named Dr. Jonathan Krein,	10:18:53
13	K-r-e-i-n. That's actually on the last page of	10:18:59
14	your materials considered, Appendix B.	10:19:04
15	A. Mm-hmm.	10:19:11
16	Q. It's the very last page of your	10:19:12
17	report, Exhibit 1.	10:19:13
18	A. Yes. I see it there.	10:19:14
19	Q. In connection with your work in	10:19:16
20	this case, did you speak with Dr. Krein?	10:19:19
21	A. I did not.	10:19:21
22	Q. Have you ever spoken to Dr. Krein	10:19:21
23	even outside the context of this case?	10:19:29
24	A. No. I had not heard of him before	10:19:31
25	the case.	10:19:33

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1	Q. Okay. Now, there are other	10:19:33
2	experts that have been retained in this case on	10:19:34
3	the Plaintiffs' side. I just want to go	10:19:37
4	through them and confirm whether or not you've	10:19:39
5	had any interaction with them.	10:19:41
6	Cristina Lopes, L-o-p-e-s, have	10:19:43
7	you had any interaction with her?	10:19:46
8	A. No.	10:19:47
9	Q. Or Dr. Bender, B-e-n-d-e-r?	10:19:47
10	A. I don't know Dr. Bender.	10:19:51
11	Q. And Dr. Spulber, S-p-u-l-b-e-r?	10:19:52
12	He's an economist from Northwestern.	10:20:00
13	A. No.	10:20:05
14	Q. So, to your knowledge, you haven't	10:20:05
15	spoken to or interacted with any of the other	10:20:07
16	experts that may have been retained in this	10:20:09
17	case, correct?	10:20:10
18	A. Correct.	10:20:11
19	Q. Okay. Dr. Choffnes, the expert	10:20:11
20	report marked as Exhibit 1 is dated February	10:20:51
21	26, 2025. Can you recall when you started	10:20:53
22	working on that report?	10:20:56
23	A. I don't have that date off the top	10:20:56
24	of my head.	10:21:01
25	Q. One of the documents you	10:21:02

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1	referenced having reviewed is the rebuttal	10:21:10
2	expert report of Barbara Frederiksen-Cross	10:21:13
3	dated February 10, 2025. This is obviously a	10:21:15
4	rebuttal report to that report, correct?	10:21:19
5	A. Correct.	10:21:21
6	Q. But was the work on this report	10:21:21
7	started before or after you saw Ms.	10:21:26
8	Frederiksen-Cross's February 10th report?	10:21:31
9	A. I believe it was after.	10:21:33
10	Q. Can you describe for me, in a real	10:21:41
11	high level sense, the process of putting	10:21:43
12	together the expert report you have marked as	10:21:45
13	Exhibit 1?	10:21:47
14	A. The process was identifying the	10:21:57
15	claims in Ms. Frederiksen-Cross's reports that	10:21:58
16	I found needed responding to, and then writing	10:22:04
17	up the responses to those things.	10:22:13
18	Q. Other than counsel, did you work	10:22:20
19	with anyone --	10:22:21
20	A. No.	10:22:23
21	Q. -- in terms of getting assistance?	10:22:23
22	A. Just me.	10:22:25
23	Q. So none of your students helped	10:22:26
24	you?	10:22:28
25	A. Correct.	10:22:28

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1	Q. Dr. Choffnes, if you could refer	10:22:28
2	to Paragraph 8 of your rebuttal report, marked	10:23:16
3	as Exhibit 1?	10:23:18
4	A. Okay.	10:23:19
5	Q. You recall reviewing Ms.	10:23:20
6	Frederiksen-Cross's opinions relating to the	10:23:22
7	network configuration used for the AWS	10:23:23
8	instances that were used for the downloads,	10:23:29
9	correct?	10:23:32
10	A. Correct.	10:23:32
11	Q. Let me just make sure I get some	10:23:32
12	terminology out. AWS, what does that refer to?	10:23:35
13	A. Amazon Web Services.	10:23:38
14	Q. And what web services do they	10:23:40
15	provide that are relevant to your opinions?	10:23:43
16	A. They provide the ability to set up	10:23:44
17	virtual machines. Virtual machines are like	10:23:52
18	computers that you might physically set up.	10:23:56
19	Like you buy a computer and it runs an	10:23:58
20	operating system. In this case they're virtual	10:24:00
21	in the sense that it's a software	10:24:03
22	representation of a computer, which in turn	10:24:05
23	runs on a computer.	10:24:07
24	So it's a way that Amazon makes	10:24:09
25	computing resources available to their	10:24:11

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1	customers.	10:24:16
2	In the context of AWS for this	10:24:17
3	matter, we're looking at what we call EC2	10:24:19
4	instances, elastic computes cloud, I think. I	10:24:20
5	can't remember what the two Cs are. But the	10:24:25
6	service that Amazon provides where customers	10:24:28
7	can set up virtual machines, they get access to	10:24:30
8	virtual machines and get to run whatever	10:24:34
9	software they want on those machines.	10:24:36
10	Q. The term "EC2 instances," that's	10:24:40
11	the code name for these virtual machines we're	10:24:45
12	talking about, right?	10:24:49
13	A. Correct. I will sometimes also	10:24:49
14	just say "instance." That's just the term of	10:24:52
15	art for a virtual machine that's been	10:24:55
16	instantiated and is running.	10:24:59
17	Q. Understood. And then you recall	10:25:01
18	that there were certain instances that were	10:25:02
19	associated with the torrent downloads by Meta	10:25:07
20	in 2024, correct?	10:25:11
21	A. Correct.	10:25:12
22	Q. Okay. And Ms. Frederiksen-Cross	10:25:12
23	provided certain opinions regarding how those	10:25:17
24	network configurations were set up, correct?	10:25:20
25	A. Correct.	10:25:24

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1	Q. And one of the things she said was	10:25:24
2	that the instances were set up to block any	10:25:26
3	connections that were not initiated by Meta.	10:25:32
4	Do you recall that?	10:25:35
5	A. Correct, yes.	10:25:36
6	Q. Now, I know there's opinions in	10:25:37
7	your report about what you think that was and	10:25:40
8	wasn't effective, but let me just go through	10:25:42
9	some basic facts.	10:25:45
10	You're not disputing that the AWS	10:25:46
11	instances that were used to download the data	10:25:49
12	sets in 2024 did, in fact, block any inbound	10:25:52
13	connections that were not initiated by Meta,	10:25:57
14	correct?	10:26:00
15	MR. STEIN: Object as to form.	10:26:00
16	A. I don't think that I agreed to	10:26:02
17	that, because there may be other ways that	10:26:04
18	connections could have been made by BitTorrent.	10:26:08
19	This was the hole punching that I was referring	10:26:11
20	to.	10:26:13
21	I would need to go into a whole	10:26:16
22	lot more detail, I guess, to explain what I'm	10:26:18
23	talking about. I'll stop there, just to offer	10:26:20
24	you an opportunity to see what you want me to	10:26:24
25	talk about next.	10:26:26

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1	Q. Okay. Well, you talk about this	10:26:26
2	technique called hole punching, correct?	10:26:34
3	A. Correct.	10:26:39
4	Q. So first let me get out the couple	10:26:40
5	of other facts. You saw in Ms.	10:26:42
6	Frederiksen-Cross's report that there was a	10:26:45
7	terraform or .TF file that was used to specify	10:26:50
8	the configuration of the EC2 instances,	10:26:53
9	correct?	10:26:56
10	A. Correct.	10:26:56
11	Q. And in your experience, what is a	10:26:56
12	terraform file?	10:27:03
13	A. So it is a file that specifies,	10:27:05
14	among other things, a network configuration,	10:27:13
15	and in this case, had rules that Amazon's	10:27:16
16	network infrastructure would enforce regarding	10:27:22
17	what connections were allowed versus which ones	10:27:26
18	would be locked by default.	10:27:30
19	Q. And did you review that terraform	10:27:30
20	file in connection with your work in this case?	10:27:32
21	A. I did.	10:27:33
22	Q. What were the rules that were	10:27:33
23	established by the terraform file?	10:27:36
24	A. Off the top of my head, they	10:27:38
25	allowed incoming connections for SSH, which is	10:27:43

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1	from Meta IP addresses. This allowed Meta	10:27:46
2	employees to log in and then launch software,	10:27:49
3	including the torrenting software.	10:27:53
4	There, I believe, was a rule that	10:27:56
5	allowed EC2 instances to communicate with each	10:28:01
6	other, and then believe there was sort of this	10:28:04
7	default rule, which is, I think, what we were	10:28:11
8	just discussing before, that unsolicited	10:28:14
9	inbound connections would not be allowed	10:28:17
10	outside of those cases I just mentioned.	10:28:19
11	Q. Outside the cases of either Meta	10:28:27
12	or other EC2 instances, correct?	10:28:29
13	A. Or other Amazon destinations, I	10:28:31
14	assume as well, because I know S3 was involved.	10:28:33
15	But, yes, at a high level, communication within	10:28:37
16	the Amazon infrastructure was allowed to a	10:28:40
17	certain degree. SSH was only allowed only for	10:28:44
18	Meta IPs for inbound connections.	10:28:46
19	Q. The Amazon infrastructure to which	10:28:48
20	communication was allowed, that would be Amazon	10:28:53
21	infrastructure that was controlled by Meta,	10:28:57
22	correct?	10:28:58
23	A. As far as I know, yes. That's an	10:28:58
24	area where I'm not as much of an expert in	10:29:10
25	terms of like how the Amazon -- the details of	10:29:13

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1	Meta's Amazon infrastructure and how they	10:29:14
2	connected to each other.	10:29:16
3	Q. In terms of the Amazon	10:29:17
4	infrastructure to which communication would	10:29:19
5	have been allowed with these instances, is	10:29:20
6	there any reason to doubt that those other	10:29:22
7	infrastructure would have been controlled by	10:29:26
8	Meta?	10:29:29
9	MR. STEIN: Object as to form.	10:29:29
10	A. It seems likely.	10:29:30
11	Q. Okay. And then we talked earlier	10:29:34
12	or you had mentioned in your report about hole	10:29:40
13	punching.	10:29:43
14	A. Mm-hmm.	10:29:44
15	Q. Now, hole punching is a technique	10:29:45
16	in which a peer can initiate a connection with	10:29:48
17	another peer, and therefore, exchange	10:29:51
18	communications with them, correct?	10:29:55
19	A. That's not how I would phrase it.	10:29:56
20	Q. Okay. If I mess it up, you're	10:30:00
21	more than free to correct me.	10:30:04
22	A. Okay. I didn't want to be too	10:30:05
23	forward on that.	10:30:09
24	So the way hole punching works is	10:30:09
25	when there's a firewall, which is the thing	10:30:14

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1	that blocks connections, when there's a	10:30:17
2	firewall between two peers, the way to get	10:30:22
3	around it is that each peer initiates a	10:30:24
4	connection towards the other that will fail,	10:30:27
5	because they are -- they're unsolicited inbound	10:30:30
6	connections.	10:30:37
7	But by initiating the connections	10:30:37
8	from both sides, the firewall thinks and	10:30:38
9	doesn't know that the connection failed, so the	10:30:42
10	peers can then try again using the same	10:30:45
11	connection parameters that failed, because now	10:30:48
12	the firewall will allow those connections to go	10:30:53
13	through because of that outbound initiated	10:30:56
14	connection that failed.	10:30:57
15	Q. Understood, sir. In order for a	10:30:59
16	peer to -- withdrawn.	10:31:06
17	So in order for another peer to	10:31:09
18	communicate with Meta's instances during the	10:31:12
19	torrent process, Meta would have had to have	10:31:16
20	initiated a connection with that peer, correct?	10:31:20
21	MR. STEIN: Object as to form.	10:31:22
22	A. Sorry, would you mind repeating	10:31:23
23	the question? I just lost you midway there.	10:31:29
24	Q. Absolutely. So you're aware that	10:31:32
25	during the torrent process Meta used certain	10:31:34

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1	Amazon instances in order to perform the	10:31:37
2	download process, correct?	10:31:39
3	A. Yes.	10:31:42
4	Q. And those instances use the	10:31:42
5	default configuration of blocking unsolicited	10:31:44
6	inbound connections, correct?	10:31:48
7	A. Correct.	10:31:50
8	Q. So in order for another peer to	10:31:50
9	have downloaded from Meta, Meta would have had	10:31:55
10	to have initiated a connection with that peer	10:31:58
11	prior to that point in time, correct?	10:32:01
12	A. Either initiated one successfully	10:32:02
13	or unsuccessfully in the case of hole punching,	10:32:08
14	yes.	10:32:10
15	Q. But even in the hole punching	10:32:10
16	example, there's still going to be a connection	10:32:15
17	request from Meta to that peer in order to open	10:32:17
18	up that connection, correct?	10:32:19
19	A. Correct.	10:32:19
20	Q. If Meta didn't initiate a	10:32:20
21	connection with that peer, would that peer be	10:32:22
22	able to download from Meta?	10:32:27
23	A. No, I don't believe it would be	10:32:29
24	able to.	10:32:33
25	Q. Okay. Dr. Choffnes, we have been	10:32:33

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1	going about an hour. I think this is probably	10:32:39
2	a good time to take our first break of the day.	10:32:40
3	I just want to make sure you	10:32:43
4	understand that this is not an endurance	10:32:44
5	contest. So if during the deposition you need	10:32:47
6	to take a break, you're entitled to ask for	10:32:49
7	one. The only caveat, we typically don't take	10:32:51
8	a break during the pendency of the question.	10:32:53
9	Does that make sense?	10:32:55
10	A. Understood. Appreciate it.	10:32:57
11	MR. WEINSTEIN: Is that okay with	10:33:00
12	you, Mr. Stein, we'll take a break now?	10:33:01
13	MR. STEIN: Yes. Thank you, Mark.	10:33:05
14	THE VIDEOGRAPHER: We are now off	10:33:08
15	the record. The time is 10:32 a.m.	10:33:10
16	(Recess taken at 10:32 a.m. and	10:33:28
17	reconvening at 10:45 a.m.)	10:33:41
18	THE VIDEOGRAPHER: We are now back	10:45:09
19	on the record. The time is 10:45.	10:45:14
20	BY MR. WEINSTEIN:	10:45:17
21	Q. Welcome back, Dr. Choffnes.	10:45:17
22	A. Thank you.	10:45:20
23	Q. Before the break, we were talking	10:45:21
24	about some of your opinions relating to the	10:45:23
25	hole-punching technique in BitTorrent.	10:45:26

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1	MR. WEINSTEIN: I'd like to	10:45:31
2	introduce as the next exhibit in order,	10:45:32
3	Exhibit 2, a copy of a document cited in	10:45:34
4	your report referred to as BEP_0055.	10:45:35
5	It's referenced in footnote 4 of your	10:45:42
6	report on the end of Paragraph 11. Let	10:45:45
7	me know when you have that exhibit in	10:45:53
8	front of you.	10:45:54
9	(Document marked as Exhibit 2	10:45:55
10	for identification)	10:46:28
11	A. I have it in front of me now.	10:46:28
12	Q. Okay. Thank you. So,	10:46:30
13	Dr. Choffnes, the court reporter has handed you	10:46:32
14	Exhibit 2. Do you recognize this as a copy of	10:46:34
15	the BEP 55 document that's cited in your	10:46:39
16	report?	10:46:41
17	A. Yes.	10:46:41
18	MR. STEIN: Objection to the	10:46:42
19	extent that this is printed on March 27,	10:46:43
20	2025 at 4:12 p.m. So to that extent, if	10:46:51
21	there are any differences, it cannot be	10:46:55
22	the exact copy or we can't know for sure	10:46:57
23	it's the exact copy he cited.	10:47:04
24	Q. Dr. Choffnes, do you see Exhibit	10:47:05
25	2, the top line says "BEP: 55"?	10:47:08

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1	A. I do.	10:47:12
2	Q. And the fourth line down says	10:47:13
3	"Last-Modified." What's the date reflected as	10:47:18
4	the last date modified of this file?	10:47:22
5	A. February 28, 2019.	10:47:24
6	Q. Do you have any reason to believe	10:47:26
7	that this isn't the same version of the	10:47:27
8	document that was cited in your report, which	10:47:29
9	was from February 26, 2025?	10:47:32
10	A. Not as I sit here, no.	10:47:35
11	Q. Okay. You refer to this in your	10:47:37
12	report as the BEP 55 standard?	10:48:03
13	A. Yes.	10:48:10
14	Q. What it refers to in this	10:48:10
15	document, "Standards Track." Just to be clear,	10:48:13
16	what do you mean by "standard"?	10:48:16
17	A. In this case, it is a standard way	10:48:17
18	to extend the default BitTorrent protocol to	10:48:23
19	enable new functionality.	10:48:26
20	Q. Okay. Before your work in this	10:48:28
21	case, have you studied the implementation of	10:48:37
22	the hole-punch extension?	10:48:41
23	A. I have not -- before this, I did	10:48:43
24	not study this particular hole-punch	10:48:48
25	implementation.	10:48:50

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1	Q. Understood. And then obviously	10:48:52
2	you studied up on it in connection with your	10:48:55
3	report, correct?	10:48:57
4	A. Yes. I teach hole punching in the	10:48:58
5	networking classes I teach.	10:49:04
6	Q. Right. So, well, hole punching	10:49:06
7	also is a term used outside the context of	10:49:10
8	BitTorrent, correct?	10:49:12
9	A. Correct. It's a generic	10:49:12
10	technique.	10:49:15
11	Q. Right. Do you teach courses on	10:49:15
12	hole punching in connection with the BitTorrent	10:49:18
13	protocol?	10:49:23
14	A. The course is not about hole	10:49:23
15	punching, but hole punching is covered as part	10:49:30
16	of the course as a way to get around firewall	10:49:30
17	restrictions.	10:49:33
18	Q. Understood. I guess my question	10:49:34
19	was, does any of your course work cover the	10:49:35
20	BitTorrent hole-punch extension?	10:49:40
21	A. It does not.	10:49:42
22	Q. Okay. In this document on Page 2	10:49:44
23	there's a heading that says "Implementation	10:49:57
24	Notes."	10:50:00
25	Do you see that?	10:50:01

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1	A. Yes.	10:50:01
2	Q. It says in this document, "If the	10:50:01
3	target peer does not wish to connect to the	10:50:03
4	initiating peer, it SHOULD ignore the connect	10:50:05
5	message silently, and MUST NOT respond to the	10:50:08
6	relaying peer with an error message."	10:50:12
7	Do you see that?	10:50:14
8	A. Yes.	10:50:15
9	Q. What is the reason that a target	10:50:15
10	peer may not wish to initiate -- withdrawn.	10:50:17
11	What's the reason a target peer	10:50:20
12	may not wish to connect to an initiating peer?	10:50:22
13	MR. STEIN: Object as to form.	10:50:25
14	A. I guess one possibility is that if	10:50:27
15	the BitTorrent peer receiving the message has	10:50:35
16	filled all of its slots for connections, then	10:50:40
17	it would not pursue a hole punch, because it	10:50:46
18	would not be used to connect to the peer that's	10:50:48
19	requesting it.	10:50:53
20	Q. Understood. Can you think of any	10:50:53
21	other examples in which the target peer would	10:50:56
22	not want to connect to the initiating peer?	10:50:59
23	A. I'm sorry, just to clarify the	10:51:02
24	question, when you say would not want to or do	10:51:06
25	you mean is not able to?	10:51:09

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1	Q. The implementation is that the	10:51:11
2	target peer does not wish to connect to the	10:51:13
3	initiating peer.	10:51:16
4	A. Their terminology. I see.	10:51:18
5	Q. And "it SHOULD" in all caps. I	10:51:20
6	was just using the language from the BEP 55	10:51:25
7	standard, so I will rephrase the question.	10:51:28
8	Are there reasons you can think of	10:51:30
9	where the target peer would not wish to connect	10:51:31
10	to the initiating peer?	10:51:35
11	A. I mean, you know, so the example I	10:51:39
12	gave before, if all of its connections are	10:51:45
13	full, "wish to," I understand, is their	10:51:47
14	terminology, but I don't know off the top of my	10:51:53
15	head what are some of the other reasons. There	10:51:59
16	could be others.	10:52:01
17	Q. Okay. Can a target peer simply	10:52:03
18	decide it doesn't want to respond to the	10:52:06
19	hole-punch request?	10:52:10
20	A. A BitTorrent client implementation	10:52:12
21	could decide to take that action. It's just it	10:52:15
22	seems like the language of this standard,	10:52:18
23	they're opening that opportunity, but they are	10:52:20
24	not specifying the conditions under which it	10:52:23
25	would happen.	10:52:26

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1	Q. And are you aware of any	10:52:27
2	conditions under which that would happen?	10:52:30
3	A. As I just said, if the BitTorrent	10:52:33
4	client had filled all of its connection slots,	10:52:37
5	I imagine that it would not respond. Even	10:52:42
6	then, it still might, depending on the	10:52:45
7	implementation.	10:52:47
8	For an example, as we talked about	10:52:49
9	before, peers come and go, and so it might want	10:52:51
10	to have sort of some backup connections that	10:52:55
11	are available for future use.	10:52:58
12	Q. Just so we're clear, other than	10:53:00
13	the situation where all the connection slots	10:53:29
14	were filled, are there any other situations you	10:53:30
15	can think of where the target peer may wish to	10:53:33
16	not connect to the initiating peer?	10:53:36
17	A. Off the top of my head, I don't	10:53:40
18	know for certain what those conditions would	10:53:46
19	be. I could imagine that there are other ones,	10:53:49
20	but sort of figuring out what they all are is	10:53:52
21	sort of beyond the scope of my work so far.	10:53:54
22	Q. Understood. Did you run any	10:53:56
23	experiments in connection with your work to	10:54:22
24	determine whether or not the network	10:54:24
25	configuration employed by Meta would affect the	10:54:27

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1	hole punching in BitTorrent?	10:54:34
2	A. I ran experiments to tell whether	10:54:37
3	BitTorrent would be able to upload while	10:54:48
4	downloading. I did not specifically look at	10:54:52
5	hole punching itself.	10:54:56
6	Q. And so did you run any experiments	10:54:57
7	to determine the impact, if any, of Meta's	10:55:08
8	network configuration on the ability of Meta	10:55:11
9	instances to upload to other peers?	10:55:19
10	MR. STEIN: Object as to form.	10:55:20
11	A. So the experiments that I did run	10:55:22
12	showed that BitTorrent clients running on AWS	10:55:26
13	instances with nearly identical configuration	10:55:30
14	as to the ones that Meta used were freely able	10:55:35
15	to upload to peers that they connected to, and	10:55:38
16	there was significant amount of uploading	10:55:42
17	behavior while downloading, regardless of hole	10:55:44
18	punching.	10:55:48
19	Q. Were you able to determine whether	10:55:55
20	or not the presence of the network	10:55:56
21	configuration had an impact on the amount of	10:55:57
22	uploading?	10:55:59
23	A. Compared to what?	10:56:00
24	Q. If the network configuration did	10:56:09
25	not block unsolicited inbound connections.	10:56:13

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1	A. No, I did not look at that	10:56:21
2	particular configuration.	10:56:22
3	Q. Now, the experiment you just	10:56:24
4	mentioned, when was that run?	10:56:38
5	A. After this report. After my	10:56:40
6	report was filed.	10:56:41
7	Q. Okay. So that experiment was not	10:56:42
8	discussed in your report, so far as you know?	10:56:45
9	A. Correct.	10:56:47
10	Q. Now, if we could turn to Paragraph	10:56:47
11	14 of your report.	10:57:07
12	A. I have it in front of me.	10:57:14
13	Q. You cite some documents involving	10:57:15
14	Meta employees, correct?	10:57:22
15	A. Correct.	10:57:23
16	Q. And just so we're clear, you	10:57:24
17	haven't interviewed any of those Meta	10:57:30
18	employees, correct?	10:57:32
19	A. Correct.	10:57:32
20	Q. And at the time you had reviewed	10:57:32
21	-- withdrawn.	10:57:38
22	At the time you did this report,	10:57:39
23	the only deposition transcript you had reviewed	10:57:43
24	was that of Mr. Mike Clark, correct?	10:57:48
25	A. That's correct.	10:57:52

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1	Q. And Mike Clark, do you have any	10:57:53
2	evidence that he was actually involved in the	10:57:57
3	torrent download process himself?	10:57:59
4	MR. STEIN: Object as to form.	10:58:02
5	A. I don't recall I have any evidence	10:58:03
6	that he was involved in it.	10:58:06
7	Q. Okay. Now, just so I'm clear, are	10:58:07
8	you providing testimony about the state of mind	10:58:13
9	of Meta employees?	10:58:16
10	MR. STEIN: Object as to form.	10:58:19
11	MR. WEINSTEIN: Withdrawn.	10:58:21
12	Q. Are you providing expert opinions	10:58:21
13	regarding the state of mind of Meta employees?	10:58:23
14	A. I'm interpreting their statements	10:58:26
15	that were provided to me.	10:58:31
16	Q. But are your opinions in this	10:58:32
17	matter independent of what the Meta employees	10:58:43
18	said?	10:58:49
19	MR. STEIN: Object as to form.	10:58:49
20	A. Are my opinions in this matter	10:58:49
21	independent of what they said? Do you mean	10:58:52
22	specifically for Paragraph 14 or are you	10:58:53
23	talking in general?	10:58:56
24	Q. Your technical opinions you	10:58:56
25	provided in this case, do they depend in any	10:58:59

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1	way by statements made by Meta employees?	10:59:04
2	MR. STEIN: Object as to form.	10:59:05
3	A. There have been documents that	10:59:07
4	help explain things, like what were the nature	10:59:11
5	of the EC2 instances that were being used, and	10:59:13
6	those come from statements from Meta employees.	10:59:17
7	So there are situations where I	10:59:19
8	would say that statements from Meta employees	10:59:21
9	are being used in my report and in my findings.	10:59:24
10	Q. Other than the EC2 instances that	10:59:28
11	are being used, what other statements of Meta	10:59:32
12	employees, if any, are you relying on for your	10:59:37
13	technical opinions in this case?	10:59:39
14	A. As some other examples, which	10:59:40
15	files were torrented. For instance, which,	10:59:46
16	Libgen, Z-Lib, when they were torrenting them,	10:59:53
17	how long it was taking, how much data they	10:59:56
18	needed for them. And there's other examples,	11:00:02
19	I'm sure, but those are sort of the top ones	11:00:08
20	that come to mind.	11:00:11
21	Q. The end of Paragraph 14 you make	11:00:11
22	the following statement, which is, "Meta	11:00:16
23	employees seemed to be quite aware that their	11:00:19
24	use of BitTorrent would cause Plaintiffs' works	11:00:22
25	to be reshared by Meta, in contrast to the	11:00:26

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1	direct download attempts they had previously	11:00:29
2	tried."	11:00:32
3	I guess my question is, sir, are	11:00:32
4	you relying on that statement for any of your	11:00:36
5	technical opinions you give in this case?	11:00:38
6	MR. STEIN: Object as to form.	11:00:39
7	A. I'm just rereading the statement	11:00:52
8	to make sure I speak clearly about it. To the	11:00:53
9	extent that they were discussing how BitTorrent	11:00:56
10	worked and how they were -- yeah, that part is	11:00:58
11	somewhat relevant, and essentially to the	11:01:05
12	question of whether they were using BitTorrent	11:01:09
13	versus direct download, those were important	11:01:11
14	for forming my expert opinion.	11:01:14
15	Q. In the previous sentence you say,	11:01:15
16	"Such statements indicate knowledge of how	11:01:22
17	BitTorrent shares content while downloading and	11:01:25
18	seeding, and, relatedly, that employees seemed	11:01:29
19	to know this conduct was not appropriate."	11:01:32
20	So let's focus on the last part of	11:01:35
21	that. You have statements in Paragraph 14	11:01:36
22	where you say that based on certain statements	11:01:37
23	by Meta employees they may have thought that it	11:01:39
24	was inappropriate.	11:01:42
25	Do you see that?	11:01:43

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1	A. Yes.	11:01:44
2	Q. My question, sir, is your view on	11:01:44
3	whether or not Meta employees thought it was or	11:01:48
4	wasn't appropriate to use BitTorrent in this	11:01:49
5	context, are you relying on that for any of the	11:01:52
6	technical opinions you're giving in this case?	11:01:55
7	MR. STEIN: Object as to form.	11:01:56
8	A. To the extent that -- their	11:01:58
9	opinions of whether it was okay to use	11:02:10
10	BitTorrent and how to configure it as a result	11:02:11
11	were relevant to this, that was important for	11:02:16
12	me to know. I'll leave it there.	11:02:18
13	Q. Right. Because it's important to	11:02:20
14	know how it was configured, but my question was	11:02:24
15	more specifically focused on whether or not	11:02:27
16	Meta employees entertained doubts as to the	11:02:30
17	propriety of the use of BitTorrent in this	11:02:30
18	context. I'll restart the question, because	11:02:50
19	the technology is not perfect, as we know.	11:02:53
20	My question was focused on your	11:02:54
21	statements in Figure 14 about whether Meta	11:02:59
22	employees had entertained doubts as to the	11:03:02
23	propriety of using BitTorrent in this context.	11:03:04
24	And my specific question was, that aspect of	11:03:07
25	your interpretation of the Meta statements, are	11:03:11

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1	you relying on that for any of the technical	11:03:14
2	opinions you're giving in this case?	11:03:16
3	A. The part that they seemed to know	11:03:17
4	the conduct was not appropriate is relevant, in	11:03:19
5	my view, only in terms of how they decided to	11:03:24
6	go about downloading it from a technical	11:03:28
7	perspective.	11:03:30
8	Q. But you know how they went about	11:03:31
9	downloading it from a technical perspective,	11:03:34
10	regardless of whether they thought it was right	11:03:38
11	or wrong, correct?	11:03:40
12	MR. STEIN: Object as to form.	11:03:41
13	A. I believe certain decisions were	11:03:42
14	made, in part, based on how they felt about it.	11:03:46
15	They might not have been made if they felt	11:03:49
16	differently about how the protocol -- or the	11:03:51
17	proprietariness of the protocol.	11:03:57
18	Q. Dr. Choffnes, you mentioned	11:03:59
19	earlier that you reviewed the report of Dr.	11:04:57
20	Krein, correct?	11:04:59
21	A. Correct.	11:05:00
22	MR. WEINSTEIN: I would like to	11:05:06
23	introduce as Exhibit 3 a copy of the	11:05:06
24	opening expert report of Dr. Jonathan	11:05:08
25	Krein, dated January 10, 2025.	11:05:10

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1	(Document marked as Exhibit 3	11:05:19
2	for identification)	11:05:57
3	A. I have it in front of me.	11:05:57
4	Q. Thank you. So Exhibit 3 is a copy	11:05:58
5	of the Krein report, and if you could confirm	11:06:11
6	that this is the report you reviewed, correct?	11:06:13
7	A. Yes, to the extent that one can	11:06:14
8	memorize hundreds of pages, this certainly	11:06:17
9	looks like the report.	11:06:20
10	Q. Understood. And it obviously	11:06:21
11	covered other aspects that were not relating to	11:06:23
12	BitTorrent, so I'll focus on only those aspects	11:06:26
13	that relate to your opinions about BitTorrent.	11:06:28
14	A. Okay.	11:06:31
15	Q. If you could turn, sir, to	11:06:31
16	Paragraph 212 of Exhibit 3, which is the Krein	11:06:43
17	opening report. That's on Page 113.	11:06:46
18	MR. STEIN: I'm noting on the	11:07:01
19	record that there's an end of reporting	11:07:02
20	on Page 87, and that there's an Appendix	11:07:07
21	A, and then we're turning our attention	11:07:24
22	to Page 113, which is Appendix D.	11:07:26
23	MR. WEINSTEIN: Thank you. That	11:07:33
24	is correct.	11:07:35
25	A. I have it in front of me.	11:07:36

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1	Q. So this is Appendix D entitled	11:07:37
2	"Description of Torrent Process in 'Fair Use	11:07:41
3	Lib' Folder."	11:07:45
4	Understanding that this is a	11:07:49
5	longer report, do you recall having reviewed	11:07:51
6	this section of Dr. Krein's report?	11:07:52
7	A. I'm not sure that I looked at this	11:07:54
8	in detail. I don't remember going through the	11:08:01
9	appendices, but from looking at the content,	11:08:04
10	I'm generally familiar with the kinds of things	11:08:08
11	that are being referred to.	11:08:11
12	Q. Okay. On the bottom of --	11:08:12
13	withdrawn.	11:08:17
14	So you're aware that there were	11:08:18
15	certain source code Python scripts that were	11:08:20
16	produced in this case that were used for	11:08:24
17	torrent downloads, correct?	11:08:27
18	MR. STEIN: Object as to form.	11:08:28
19	A. Correct.	11:08:29
20	Q. And some of those scripts were	11:08:34
21	referred to by Dr. Krein in his report,	11:08:36
22	correct?	11:08:38
23	A. Correct.	11:08:38
24	Q. And those scripts do not seem to	11:08:38
25	be a focus of your report; is that correct?	11:08:41

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1	MR. STEIN: Object as to form.	11:08:43
2	A. I suppose the focus isn't on the	11:08:44
3	scripts themselves, but they were taken into	11:08:51
4	account when understanding the configuration	11:08:53
5	and its implications for the downloading that	11:08:54
6	they did. So I did not cite additional source	11:08:57
7	code material, because that was not necessary,	11:08:59
8	I felt, for my scope of work.	11:09:04
9	Q. Okay. If you could turn to the	11:09:05
10	bottom of Page 114 of the Krein report?	11:09:09
11	A. Okay. I'm there.	11:09:22
12	Q. And then the last sentence on Page	11:09:22
13	114 and beginning to Page 115 says, "The status	11:09:24
14	of the download is checked every 60 seconds by	11:09:28
15	calling the function i.s_seed. Once the	11:09:34
16	function i.s_seed returns true, the BitTorrent"	11:09:37
17	client "remove_torrent is called. This deletes	11:09:37
18	the shadow library file from local storage, so	11:09:42
19	it is no longer seeded for other peers in the	11:09:43
20	network to download."	11:09:46
21	Do you see that?	11:09:48
22	A. I do.	11:09:48
23	Q. Are you familiar with the process	11:09:49
24	that he's describing in that paragraph?	11:09:50
25	A. I'm familiar with the process and	11:09:52

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1	the code. I'll leave it there.	11:09:54
2	Q. Do you agree with the statement	11:09:59
3	that I just read from the Krein report?	11:10:01
4	A. I don't agree that the file is	11:10:03
5	deleted. "Remove_torrent" means that you	11:10:08
6	disconnect from the swarm, as we discussed	11:10:11
7	earlier. It doesn't involve deleting the data.	11:10:13
8	The data in the scripts that I've seen were	11:10:17
9	later on copied somewhere else.	11:10:20
10	So the way that this is written is	11:10:22
11	ambiguous from my perspective, because it	11:10:24
12	doesn't -- it could be interpreted differently,	11:10:28
13	that the actual payload was removed, when it	11:10:31
14	wasn't.	11:10:35
15	Q. Okay. I will break it down in	11:10:35
16	pieces. Based on the code that you looked at,	11:10:41
17	do you agree that the status of the torrent	11:10:43
18	download is checked every 60 seconds?	11:10:45
19	A. Yes.	11:10:48
20	Q. And it's checked to see if it's	11:10:48
21	complete, correct?	11:10:50
22	A. Correct.	11:10:51
23	Q. And once it's complete, the	11:10:51
24	removed torrent function is called, correct?	11:10:58
25	A. Within 60 seconds of completion,	11:11:00

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1	because it, of course, could have completed any	11:11:04
2	time between -- in that 60 seconds since the	11:11:06
3	previous check.	11:11:09
4	Q. It could have happened 60 seconds	11:11:09
5	or one second, correct?	11:11:14
6	A. Correct.	11:11:16
7	Q. And once the torrent download is	11:11:16
8	complete, the remove_torrent function is	11:11:21
9	called, correct?	11:11:27
10	A. Sorry, it's after that timer	11:11:27
11	fires, which means the seed function is called,	11:11:32
12	that could take anywhere between zero and 60	11:11:34
13	seconds from when the torrent actually	11:11:37
14	completed, which is to say the payload was	11:11:40
15	complete, only at that point is remove_torrent	11:11:42
16	is called.	11:11:48
17	Q. So once the code realizes that the	11:11:48
18	torrent download is complete, the	11:11:51
19	remove_torrent function is called, correct?	11:11:53
20	A. Yes.	11:11:54
21	Q. And then the remove_torrent	11:11:56
22	function removes the torrent from the network,	11:11:59
23	correct?	11:12:02
24	MR. STEIN: Object as to form.	11:12:03
25	A. My understanding of the	11:12:09

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1	remove_torrent method is that it disconnects	11:12:11
2	from the swarm, which would terminate	11:12:15
3	connections with any peers that it had at that	11:12:17
4	time.	11:12:20
5	Q. Which would obviously prevent	11:12:20
6	uploaded information to any peers, correct?	11:12:20
7	A. At that point, yes.	11:12:22
8	Q. Understood. And that --	11:12:23
9	withdrawn.	11:12:44
10	Based on your analysis, that logic	11:12:45
11	was in place in the scripts used to perform the	11:12:53
12	2024 torrent downloads, correct?	11:12:56
13	A. Correct.	11:12:59
14	Q. If we could turn, Dr. Choffnes,	11:12:59
15	just back to your report, Exhibit 1, Paragraph	11:13:33
16	17. You can put Exhibit 3 to the side now if	11:13:39
17	you'd like.	11:13:43
18	A. Paragraph 17?	11:13:54
19	Q. Yes.	11:13:55
20	A. I have that in front of me.	11:13:56
21	Q. Earlier we talked about trying to	11:13:59
22	get some terminology on the record to explain	11:14:01
23	some of these basic concepts.	11:14:03
24	Can you describe for me what	11:14:05
25	"unchoking" refers to in the context of	11:14:11

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1	BitTorrent?	11:14:12
2	A. Sure. So to set the context, in	11:14:14
3	BitTorrent's multiple peers are connected to	11:14:16
4	each other. From the perspective of two peers	11:14:18
5	connected to each other, unchoking is when one	11:14:21
6	of those peers allows uploading to another peer	11:14:25
7	that is interested in its content.	11:14:35
8	Q. What is an unchoke slot?	11:14:39
9	A. So by default in BitTorrent,	11:14:49
10	there's not an unlimited number of connections	11:14:51
11	that are allowed to upload all at once, because	11:14:54
12	that would spread available bandwidth too line,	11:14:59
13	potentially, meaning if everyone is trying to	11:15:02
14	download the same thing -- sorry, upload at the	11:15:05
15	same time from the same peer, that each one	11:15:06
16	might get a trickle.	11:15:09
17	So instead, BitTorrent puts a	11:15:11
18	limit on the number of peers that can be	11:15:13
19	uploaded to at the same time from any given	11:15:15
20	peer.	11:15:19
21	So an unchoke slot refers to one	11:15:21
22	of those available connections that can be	11:15:25
23	uploaded to.	11:15:27
24	Q. Sir, if you could turn to	11:15:28
25	Paragraph 23 of your report.	11:16:32

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1	A. I'm there.	11:16:34
2	Q. Thank you, sir. In connection	11:16:35
3	with your report, you provide certain	11:16:37
4	probabilities that you believe are relevant to	11:16:41
5	whether or not Meta shared a piece in	11:16:44
6	Plaintiffs' work, correct?	11:16:49
7	A. Correct.	11:16:51
8	Q. In Table 2, one of the factors you	11:16:51
9	used was the "Hours Leeching," correct?	11:16:54
10	A. Yes, correct.	11:16:57
11	Q. By "leeching," we're talking about	11:17:02
12	the period of time when Meta was downloading	11:17:03
13	the torrent, correct?	11:17:06
14	A. Correct.	11:17:08
15	Q. Your probabilities, correct me if	11:17:08
16	I'm wrong, do not take into account a period of	11:17:13
17	time, if any, that Meta was seeding, correct?	11:17:16
18	A. Correct.	11:17:19
19	Q. Dr. Choffnes, the data sets at	11:17:19
20	issue here, you understand were Internet	11:18:36
21	Archive, Z-Lib and portions of Libgen, correct?	11:18:41
22	A. By "at issue here," what are you	11:18:47
23	referring? In what context are you referring?	11:18:49
24	Q. The data sets that you contend	11:18:52
25	there was some probability of uploading by	11:18:54

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1	Meta.	11:18:57
2	MR. STEIN: Object as to form.	11:18:57
3	A. My report relies on the data sets	11:18:59
4	in Dr. Frederiksen-Cross's report, which	11:19:05
5	through recent discovery we know is not the	11:19:08
6	complete set.	11:19:10
7	Q. Before your work on this case, had	11:19:11
8	you ever done any work with Libgen?	11:19:23
9	A. I've only barely heard of it	11:19:24
10	before this matter.	11:19:27
11	Q. The same with Anna's Archive?	11:19:28
12	A. I had never heard of it before	11:19:38
13	this.	11:19:40
14	Q. And Z-Lib, the same?	11:19:40
15	A. Correct. I had not heard of it	11:19:43
16	beforehand.	11:19:45
17	Q. When you reviewed Ms.	11:19:45
18	Frederiksen-Cross's report of February 10th to	11:20:28
19	which you responded in this report, did you see	11:20:32
20	any materials she provided relating to the list	11:20:38
21	of downloaded files from Internet Archive,	11:20:41
22	Z-Lib and Libgen?	11:20:47
23	A. I had access to whatever she	11:20:50
24	provided as provided as part of her report. I	11:20:55
25	did not -- as I stated in this paragraph, I did	11:20:58

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1	not analyze -- I did not check her analysis. I	11:20:59
2	relied entirely on her analysis.	11:21:02
3	Q. Okay. So as far as her analysis	11:21:05
4	of what's in those files and where the	11:21:10
5	Plaintiffs' works are in those files, and what	11:21:14
6	percentage of those works constitute those	11:21:17
7	files, you don't have any reason to doubt	11:21:20
8	anything in her report, correct?	11:21:23
9	MR. STEIN: Object as to form.	11:21:24
10	A. I would not put it that way. I	11:21:25
11	would just say that I haven't checked.	11:21:27
12	Q. Okay.	11:21:28
13	A. For the purpose of this report, I	11:21:31
14	used her materials. I did not verify them or	11:21:34
15	validate them.	11:21:37
16	Q. Or for purposes of this report	11:21:39
17	dispute them, correct?	11:21:44
18	A. I reserve the right to revisit if	11:21:48
19	they become disputed. I did not take the	11:21:51
20	opportunity to dispute them in this report.	11:21:53
21	Q. Okay. That's fair. Now, you	11:21:56
22	refer to something in the report as a Bernoulli	11:22:14
23	experiment, correct?	11:22:20
24	A. Correct.	11:22:21
25	Q. And again, just because the case	11:22:21

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1	is going to be heard by probably a	11:22:25
2	non-technical audience, can you describe what a	11:22:28
3	Bernoulli experiment is?	11:22:31
4	A. Sure. Without getting into	11:22:32
5	technical details, the idea is often reduced	11:22:37
6	to, say, a coin toss experiment, and trying to	11:22:41
7	understand what are probabilities of results	11:22:45
8	coming out of that coin-flipping experiment in	11:22:48
9	terms of what is the likelihood of, say, never	11:22:50
10	having it show up heads after this many coin	11:22:53
11	tosses.	11:22:59
12	It's, of course, more complicated	11:23:00
13	in practice, but the theory behind the	11:23:02
14	Bernoulli experiments is how to come up with a	11:23:05
15	mathematical quantification of the likelihood	11:23:08
16	of certain events happening from a statistical	11:23:10
17	perspective.	11:23:12
18	Q. In the example of a coin toss,	11:23:17
19	each of those events is independent of the	11:23:20
20	other, correct?	11:23:22
21	A. Correct.	11:23:22
22	Q. So if I flip a coin one time or	11:23:28
23	ten times, every single time I flip it, it's	11:23:30
24	going to have a 50/50 chance of heads or tails,	11:23:32
25	correct?	11:23:39

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1	A. Correct.	11:23:39
2	Q. In Paragraph 24 of your report,	11:23:40
3	you say, "To calculate the probability that	11:23:41
4	Meta shared at least one piece of Plaintiffs'	11:23:47
5	works, I focus on a Bernoulli experiment, where	11:23:51
6	the probability of BitTorrent picking a piece	11:23:55
7	of Plaintiffs' works is fixed and statistically	11:23:58
8	independent."	11:24:00
9	Do you see that?	11:24:01
10	A. Yes.	11:24:02
11	Q. What do you mean by "fixed and	11:24:02
12	statistically independent"?	11:24:04
13	A. So by "fixed," I mean that the	11:24:06
14	probability doesn't change over time. And by	11:24:08
15	"statistically independent," it's the example	11:24:12
16	you just gave, where one coin toss or I think	11:24:17
17	you were about to say roll of the dice is not	11:24:21
18	dependent on the previous one.	11:24:24
19	These are the conditions required	11:24:26
20	to use the Bernoulli experiment theory.	11:24:27
21	Q. That was my next question. Why	11:24:31
22	are those conditions required to use the	11:24:34
23	Bernoulli experiment?	11:24:37
24	A. The math changes and gets a lot	11:24:37
25	more complicated if you don't.	11:24:39

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1	Q. What's an example of something	11:24:41
2	where the probability is not fixed --	11:24:47
3	withdrawn.	11:24:51
4	So to use the Bernoulli	11:24:51
5	experiment, you need both the -- withdrawn.	11:24:54
6	So the statement in Paragraph 24	11:25:01
7	says "the probability of BitTorrent picking a	11:25:02
8	piece of Plaintiffs' works is fixed and	11:25:07
9	statistically independent."	11:25:09
10	Just to clarify, to use the	11:25:10
11	Bernoulli experiment, both of those conditions	11:25:12
12	being fixed and be statistically independent is	11:25:14
13	required, correct?	11:25:18
14	A. Those are the conditions under	11:25:18
15	which the theory holds, yes.	11:25:20
16	Q. Okay. Have you ever used a	11:25:22
17	Bernoulli experiment prior to this case to	11:25:50
18	estimate the probability that data was shared	11:25:51
19	using BitTorrent?	11:25:54
20	A. No. Sorry, that was a no.	11:25:55
21	Q. Okay.	11:25:59
22	A. I don't know if you heard me. It	11:26:00
23	just came out quiet.	11:26:01
24	Q. No problem. Do you know if anyone	11:26:02
25	else in the fields has ever used a Bernoulli	11:26:05

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1	experiment to estimate the probability that	11:26:08
2	data was shared using BitTorrent?	11:26:10
3	A. I'm not aware of any other	11:26:13
4	situation where that came up in the literature.	11:26:15
5	Q. Do you know if there were other	11:26:18
6	models that had been used in the past to	11:26:20
7	estimate the probability that data was shared	11:26:22
8	using BitTorrent?	11:26:25
9	A. I've looked for them. I don't	11:26:26
10	believe that the academy was interested in	11:26:29
11	exploring that problem. So I didn't find	11:26:32
12	anything in the literature to rely on for that	11:26:35
13	particular question.	11:26:37
14	Q. What do you mean by "academy"?	11:26:40
15	A. The -- sorry, finish your	11:26:43
16	question.	11:26:46
17	Q. By "academy," you mean academy in	11:26:46
18	general?	11:26:52
19	A. Exactly. I couldn't find anything	11:26:52
20	in the scientific literature that took on this	11:26:55
21	question. So as a result, I was unable to rely	11:26:56
22	on, for example, peer-reviewed previous	11:26:59
23	research on that topic.	11:27:01
24	Q. Understood. Sir, if you could go	11:27:02
25	back to Paragraph 23 of your report, Exhibit 1.	11:28:31

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1	A. Mm-hmm.	11:28:34
2	Q. In Paragraph 24 you talk about "at	11:28:35
3	least one piece of Plaintiffs' works." Do you	11:28:48
4	recall what the piece size was for the portion	11:28:54
5	of Libgen that was downloaded via torrent in	11:28:56
6	2024?	11:29:03
7	A. I do not. I did not engage in the	11:29:03
8	download activity, so I relied entirely on the	11:29:07
9	Frederiksen-Cross report for that kind of data.	11:29:10
10	Q. But I'm just -- I understand that.	11:29:12
11	Did you just know what the piece size was?	11:29:16
12	A. No, I don't, off the top of my	11:29:18
13	head. That wasn't something that I focused on	11:29:20
14	in this report.	11:29:22
15	Q. Okay. Same for Z-Lib and Internet	11:29:22
16	Archive?	11:29:26
17	A. Correct. I would not be able to	11:29:26
18	tell you what the piece size is for them.	11:29:28
19	Q. Understood. If we could turn back	11:29:32
20	to Paragraph 21 of your report?	11:29:48
21	A. I'm there.	11:29:51
22	Q. One of the assumptions that you	11:29:52
23	made for your analysis in this report was that	11:29:53
24	the download of each torrent takes one hour,	11:29:58
25	correct?	11:30:02

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1	A. Correct.	11:30:03
2	Q. In connection with your report,	11:30:03
3	what did you use to come up with the one hour	11:30:05
4	per torrent estimate?	11:30:08
5	A. So the following sentence says,	11:30:11
6	"Given that Meta was known to be torrenting for	11:30:14
7	weeks, this seemed like a conservative	11:30:17
8	estimate."	11:30:20
9	Q. I understand that. Is that so --	11:30:27
10	but in terms of like picking one hour, what was	11:30:30
11	the thinking behind that?	11:30:34
12	A. For instance, it would seem unfair	11:30:35
13	to say that each torrent was being downloaded	11:30:39
14	for weeks, because I don't believe that it took	11:30:41
15	multiple weeks for all of -- each individual --	11:30:45
16	I didn't believe that each individual torrent	11:30:50
17	file took three weeks. So in other words, the	11:30:52
18	downloading and uploading wasn't active for	11:30:54
19	that long.	11:30:57
20	These were also large files, so I	11:30:58
21	did not think that they would finish in	11:31:01
22	minutes, small numbers of minutes. So I chose	11:31:02
23	something that was substantial, but also in my	11:31:04
24	view conservative, so that I would reduce the	11:31:06
25	risk of overestimating probabilities.	11:31:10

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1	The underlying issue here is the	11:31:14
2	longer that the torrenting -- the longer the	11:31:17
3	leeching is happening, the more opportunities	11:31:20
4	there are to upload, and that increases the	11:31:22
5	chance that Meta will share at least one of the	11:31:23
6	Plaintiffs' -- piece or a block of one of the	11:31:25
7	Plaintiffs' works.	11:31:29
8	Q. So based on your experience with	11:31:29
9	BitTorrent, what are the factors that influence	11:31:36
10	the amount of time it takes to download a	11:31:38
11	particular torrent?	11:31:39
12	A. So of course there's a number of	11:31:40
13	factors. In general, it's the bandwidth	11:31:45
14	available to you for downloading from all of	11:31:48
15	the other peers in the swarm, and that	11:31:50
16	bandwidth may be disputed in a number of	11:31:54
17	different ways, and there may be demands on	11:31:56
18	that bandwidth from multiple other peers.	11:31:58
19	The bottom line is, it really just	11:32:02
20	depends on how much bandwidth there is for	11:32:04
21	downloading from other peers. It doesn't	11:32:09
22	matter necessarily how long your bandwidth is,	11:32:11
23	as long as -- well, you're ultimately bound by	11:32:14
24	your own bandwidth as well.	11:32:17
25	In the case of Meta, I believe I	11:32:19

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1	read it was 18 gigabits per second, which is a	11:32:21
2	very fast link. So I don't think it was	11:32:24
3	limited by that or there's a limited extent to	11:32:26
4	which it was limited by that.	11:32:31
5	Q. You mentioned that there's a	11:32:32
6	number of factors, one obviously is the	11:32:51
7	bandwidth available for downloading. What are	11:32:53
8	other factors, if any?	11:32:56
9	A. We have to -- so I guess when I	11:32:58
10	said bandwidth available, I mean bandwidth in	11:33:07
11	the sense that peers would send you data, and	11:33:13
12	sending you data means either seeders in the	11:33:15
13	swarm send you data, because, you know, if	11:33:17
14	you're selected by them, that's the only thing	11:33:22
15	they do is upload, or leechers. In that case	11:33:24
16	it means that you are selected among their	11:33:26
17	limited unchoke slots to receive data from	11:33:28
18	them.	11:33:34
19	Q. Understood. By bandwidth, you	11:33:35
20	weren't just referring to the raw input and	11:33:39
21	output speed of the network connection,	11:33:41
22	correct?	11:33:43
23	A. Correct. I was sort of wrapping	11:33:44
24	that all together as the bandwidth available to	11:33:45
25	appear from the swarm.	11:33:48

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1	Q. Understood. So the bandwidth	11:33:49
2	available to a peer depends obviously, in part,	11:33:51
3	on the speed of its network connection,	11:33:54
4	correct?	11:33:57
5	A. Mm-hmm.	11:33:57
6	Q. And the composition of the swarm,	11:33:57
7	correct?	11:34:00
8	A. Yes, and the availability of peers	11:34:00
9	in the swarm to be able to upload to them.	11:34:07
10	Q. And obviously the network	11:34:11
11	bandwidth of the other peers is also relevant,	11:34:21
12	correct?	11:34:25
13	A. Correct. And that was also -- I	11:34:25
14	was trying to wrap that all into available	11:34:26
15	bandwidth. But these are other factors that	11:34:29
16	come into play to determine what that number	11:34:32
17	is.	11:34:33
18	Q. If a swarm has only a small number	11:34:34
19	of peers, could that cause a torrent to slow	11:34:38
20	down or even stall out?	11:34:42
21	A. When you say "slow down," you mean	11:34:44
22	relative to what?	11:34:51
23	Q. If it had more peers.	11:34:52
24	A. It really depends on their	11:34:55
25	bandwidth.	11:34:58

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1	Q. All things being equal, having	11:34:58
2	more peers, would that generally increase the	11:35:09
3	bandwidth available to a downloading peer?	11:35:11
4	A. If they all have the same	11:35:16
5	available bandwidth to provide, and there were	11:35:18
6	more of those peers, then, yes, I would expect	11:35:21
7	that in that situation you would be able to	11:35:24
8	download faster.	11:35:26
9	There are limits because of the	11:35:30
10	upload slots, though. So it doesn't go on	11:35:31
11	forever. There are points at which you have	11:35:35
12	more peers and you do not necessarily get	11:35:36
13	faster downloads.	11:35:40
14	Q. You also say in this paragraph	
15	that "libtorrent uses eight unchoke slots,"	
16	correct?	
17	A. Correct.	
18	Q. And you say that "unchoke	
19	decisions are re-evaluated by the libtorrent	
20	client every 15 seconds."	
21	Do you see that?	
22	A. Yes.	
23	Q. Do those decisions result in peers	
24	being -- withdrawn.	
25	First of all, when you're in a	

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 1      torrent or a swarm, is it always the case that

 2      all eight unchoke slots are going to be filled?

 3           A.    It is not necessarily always the

 4      case.

 5                COURT REPORTER:  I'm sorry,

 6           there's an issue here.  Could we go off

 7           the record?

 8                THE VIDEOGRAPHER:  We are now

 9           going off the record.  The time is

10           11:36.

11                (Luncheon recess taken at 11:36

12           a.m. and reconvening at 12:22 p.m.)      12:22:54

13                THE VIDEOGRAPHER:  We are now back  12:22:54

14           on the record.  The time is 12:22 p.m.   12:23:22

15      BY MR. WEINSTEIN:                             12:23:27

16           Q.    Welcome back, Dr. Choffnes.        12:23:27

17           A.    Thank you.                         12:23:29

18           Q.    Before the break, we were talking  12:23:29

19      about the assumption in your report with      12:23:33

20      respect to the amount of time --              12:23:39

21                MR. STEIN:  I'm sorry, Counsel, my  12:23:40

22           realtime is not working at all.  Do you  12:23:42

23           mind if we go off the record.

24                COURT REPORTER:  You don't need to

25           go off the record.  It'll be two
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1	seconds.
2	MR. WEINSTEIN: I'm getting what
3	you just said.
4	MR. STEIN: Thank you. Sorry to
5	interrupt you, Counsel.
6	MR. WEINSTEIN: That's perfectly
7	okay. Can you do a little test to see
8	if it's working? I see it.
9	Q. Welcome back, Dr. Choffnes.
10	A. Thank you.
11	Q. Before the break, we were talking
12	about one of the assumptions in your report
13	that underlies your probability estimate, which
14	is that each torrent takes one hour to
15	download.
16	Do you recall that?
17	A. Yes.
18	Q. Now, the amount of time that a
19	torrent takes to download, you would agree that
20	it does depend on the size of the torrent
21	payload being downloaded, correct?
22	A. Yes.
23	Q. The larger the payload, all things
24	being equal, the more time it would take,
25	correct?

Timestamps:
- Line 8: 12:24:37
- Line 9: 12:24:37
- Line 10: 12:24:46
- Line 11: 12:24:48
- Line 12: 12:24:49
- Line 13: 12:24:52
- Line 14: 12:24:55
- Line 15: 12:24:59
- Line 16: 12:24:59
- Line 17: 12:25:00
- Line 18: 12:25:00
- Line 19: 12:25:03
- Line 20: 12:25:06
- Line 21: 12:25:09
- Line 22: 12:25:11
- Line 23: 12:25:19
- Line 24: 12:25:21
- Line 25: 12:25:23

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1	A. Correct.	12:25:23
2	Q. And the rate at which Meta would	12:25:24
3	be downloading a torrent, could that change	12:25:27
4	over the course of the download of that	12:25:30
5	torrent?	12:25:33
6	A. Yes.	12:25:33
7	Q. What are the factors that would	12:25:36
8	influence whether the rate would go up or down	12:25:38
9	during the download of a torrent?	12:25:43
10	A. It goes back to that item we	12:25:45
11	discussed previously, which is the bandwidth	12:25:47
12	from the swarm that's available to it.	12:25:49
13	Q. For example, if peers enter or	12:25:50
14	disappear from a swarm which Meta is downloaded	12:25:56
15	into a torrent, could that affect the speed	12:25:59
16	into which Meta's download proceeds?	12:26:02
17	A. It can affect the speed, yes.	12:26:05
18	Q. Can you give me an example that	12:26:06
19	you can think of where that might happen?	12:26:08
20	A. An example where which part might	12:26:10
21	happen?	12:26:14
22	Q. Where as peers enter or disappear	12:26:14
23	from a swarm, in which Meta is downloaded in a	12:26:16
24	torrent, that could affect the speed of Meta's	12:26:20
25	download?	12:26:23

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1	A. So as an example, I guess if they	12:26:24
2	are connected to a peer that's offering them a	12:26:32
3	lot of download bandwidth, and that peer leaves	12:26:34
4	the swarm or otherwise decides to disconnect	12:26:38
5	from them, then they would download more	12:26:41
6	slowly.	12:26:45
7	Q. Understood. If other leechers	12:26:45
8	entered the swarm who were newly starting a	12:26:48
9	download, could that also affect the speed at	12:26:50
10	which Meta would have continued its download?	12:26:52
11	A. By newly entering, you mean that	12:26:56
12	they do not have any pieces to share?	12:26:59
13	Q. Correct.	12:27:01
14	A. So if new peers come in, and those	12:27:02
15	peers who come in have no pieces to upload to	12:27:06
16	Meta, then it should not affect Meta's ability	12:27:08
17	to download or the rate at which it would	12:27:11
18	download.	12:27:14
19	Q. Wouldn't those peers be competing	12:27:14
20	with the seeders for the download?	12:27:18
21	MR. STEIN: Object to form.	12:27:20
22	A. So the question is how much	12:27:21
23	available bandwidth there is in the swarm for	12:27:27
24	those new peers and whether that changes the	12:27:30
25	amount of bandwidth that any other peer is able	12:27:31

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1	to get from that swarm.	12:27:35
2	So new demands on the swarm does	12:27:37
3	not necessarily take away from others. It	12:27:40
4	really depends on the dynamics of that swarm.	12:27:43
5	Q. Can it take away from the others?	12:27:46
6	A. It's possible.	12:27:48
7	Q. What circumstances would lead to	12:27:50
8	that, that you can recall?	12:27:55
9	A. So for a newly entered peer, who	12:27:57
10	is relying on optimistic unchoking to download	12:28:04
11	data, that downloading would have to come from	12:28:08
12	an optimistic unchoke slot that had otherwise	12:28:12
13	been allocated to the peer that was previously	12:28:17
14	downloading before they entered and not	12:28:21
15	replaced by a different peer that that peer was	12:28:24
16	also connected to.	12:28:27
17	The thing to keep -- I'm not	12:28:29
18	trying to be evasive. The reason is that peers	12:28:31
19	maintain more connections than they can use at	12:28:35
20	once. So when one connection becomes	12:28:39
21	unavailable, they start using another one. And	12:28:41
22	so it's unclear at any point in time whether	12:28:43
23	the removal of one of those connections is	12:28:46
24	going to impact their download speed in either	12:28:49
25	a positive or negative way, because we don't	12:28:55

1	know what they switched to afterward.	12:28:58
2	Q. Understood. If seeds were removed	12:29:00
3	from the swarm, could that affect the speed at	12:29:03
4	which Meta could have continued the download of	12:29:06
5	the torrent?	12:29:10
6	A. If the -- it really -- in that	12:29:10
7	case, it depends on whether the seeds have data	12:29:15
8	that Meta wanted, and the peers did not have	12:29:18
9	that data. And also that Meta had no other	12:29:23
10	data that it wanted to get from those peers.	12:29:26
11	So it was relying at that point in	12:29:29
12	the download entirely on a seeder.	12:29:31
13	Q. Understood. Any other	12:29:33
14	circumstances that you can think of in which	12:29:40
15	the removal of a seeder from the swarm could	12:29:42
16	have affected the rate at which Meta could have	12:29:45
17	continued the download of the torrent?	12:29:48
18	MR. STEIN: Object as to form.	12:29:49
19	A. It's not something that I've	12:29:50
20	thought about too carefully, but I think I was	12:29:53
21	speaking in a reasonably general way in terms	12:29:56
22	of how that might happen.	12:29:58
23	Q. Understood. Would you agree that	12:30:00
24	the amount of time that it took Meta to	12:30:03
25	download a particular torrent would likely have	12:30:06

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1	varied on a torrent-by-torrent basis?	12:30:10
2	MR. STEIN: Object as to form.	12:30:14
3	A. I think it's safe to say that not	12:30:15
4	every torrent takes exactly the same amount of	12:30:17
5	time to download. But I think if certain	12:30:20
6	evidence were available, we would, say, be able	12:30:26
7	to calculate an average amount of time.	12:30:28
8	Q. I'm just talking about based on	12:30:30
9	your experience as an expert with the	12:30:33
10	BitTorrent protocol, you understand that the	12:30:35
11	rate at which torrents are downloaded can vary	12:30:39
12	from torrent to torrent, correct?	12:30:45
13	A. Sure.	12:30:50
14	Q. Based on, for example, the size of	12:30:51
15	the torrent, correct?	12:30:53
16	A. That is a factor, yes.	12:30:54
17	Q. As well as the composition of the	12:30:56
18	swarm as we discussed?	12:30:58
19	A. And the bandwidth that is	12:30:59
20	available to them and the capacity for	12:31:01
21	downloading from the peer that is trying to	12:31:03
22	download.	12:31:07
23	Q. Okay. So what I just talked about	12:31:07
24	was sort of like from torrent to torrent, we	12:31:10
25	talked about within an individual torrent, for	12:31:15

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1	example. Would you agree that in a download of	12:31:17
2	a particular torrent, the speed at which Meta	12:31:19
3	would have been downloading could have varied	12:31:23
4	during that download process?	12:31:27
5	A. Yes, in general. The download	12:31:28
6	speed is not constant.	12:31:31
7	Q. Okay. And maybe it's the same	12:31:32
8	factors as before, but what are the factors	12:31:35
9	that would influence the rate at which Meta at	12:31:37
10	any particular time is able to complete a	12:31:42
11	download of a particular torrent?	12:31:44
12	A. It's going to depend ultimately	12:31:47
13	bounded by the capacity of the network link	12:31:49
14	that's available. I guess it's worth adding	12:31:51
15	since we're talking about multiple torrents	12:31:55
16	being downloaded in parallel at large scale,	12:31:57
17	that you have to kind of divide that bandwidth	12:32:00
18	among all of the different torrents that are	12:32:02
19	being downloaded at the same time on the same	12:32:04
20	machine. So that's going to reduce their total	12:32:06
21	download bandwidth.	12:32:08
22	But whatever their fair share of	12:32:11
23	that is, whatever they get access to, that's	12:32:12
24	the ultimate limit.	12:32:14
25	And then within that capacity, it	12:32:18

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1	depends on the bandwidth available from all of	12:32:19
2	the other peers in the swarm for each torrent.	12:32:22
3	Essentially, the bandwidth that other peers are	12:32:26
4	willing to give the BitTorrent client, the	12:32:29
5	peer. Sorry, I could just say peer to keep it	12:32:37
6	consistent.	12:32:45
7	Q. In Paragraph 21 of your report,	12:32:45
8	which is marked as Exhibit 1, you talk about	12:33:04
9	unchoke slots.	12:33:07
10	A. Mm-hmm.	12:33:08
11	Q. There being eight unchoke slots.	12:33:08
12	We talked earlier before the break about	12:33:11
13	whether it was possible during the download of	12:33:14
14	a torrent that not all eight unchoke slots	12:33:16
15	would be filled by a BitTorrent client.	12:33:19
16	That's true, correct?	12:33:22
17	A. Correct.	12:33:24
18	Q. What are the reasons why all eight	12:33:25
19	unchoke slots may not be filled in a particular	12:33:27
20	swarm?	12:33:37
21	A. That would happen if there wasn't	12:33:37
22	demand for uploading from that peer. So, for	12:33:44
23	instance, not enough connections that were	12:33:46
24	trying to upload from that peer.	12:33:49
25	Q. Now, what's the example of in the	12:33:51

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1	real world when you would imagine that could	12:33:54
2	take place?	12:33:56
3	A. I'd imagine if you there was -- if	12:33:57
4	joined a swarm and there were only seeders,	12:34:04
5	there would be no uploading. No one would have	12:34:07
6	any demand for those unchoke slots.	12:34:11
7	Q. What if there were only a small	12:34:13
8	amount of leechers, is that another example of	12:34:15
9	which all eight unchoke slots may not be	12:34:17
10	filled?	12:34:20
11	A. I think that's possible. I'm not	12:34:20
12	sure as I sit here whether there's something in	12:34:21
13	the client that would give those extra unchoke	12:34:23
14	slots to those peers or if each one would still	12:34:25
15	just get the one.	12:34:28
16	But for argument sake, we could	12:34:30
17	say one assumption might be that the client	12:34:32
18	would -- say if there were only three peers, it	12:34:35
19	might only use three unchoke slots.	12:34:39
20	I did not check the libtorrent	12:34:41
21	implementation to see if that's what they do.	12:34:44
22	Q. Understood. And then if another	12:34:47
23	peer is in a particular client's unchoke slot,	12:34:50
24	does that necessarily mean that the client is	12:34:53
25	uploading data to that peer?	12:34:55

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1	A. It does not. As I mentioned later	12:34:57
2	in that paragraph, there needs to be mutual	12:35:03
3	interest. And so, that's with one of the	12:35:06
4	conditions under which you would see the	12:35:14
5	unchoking is where each peer is interested in	12:35:16
6	something the other one has so that they	12:35:19
7	exchange data with each other.	12:35:21
8	Q. That's a great segue to the next	12:35:23
9	question. Later in Paragraph 21, you assume	12:35:39
10	there is a 50 percent chance that the peer	12:35:42
11	connected to Meta's client has a piece that	12:35:51
12	Meta wants, correct?	12:35:52
13	A. Yes. As I explain, this is sort	12:35:54
14	of -- because this is a statistical model	12:35:55
15	that's supposed to represent many different	12:36:00
16	peers over time and in different changes in	12:36:03
17	their downloads, I picked the value that was in	12:36:05
18	the middle between zero and 100 percent, with	12:36:07
19	the assumption that some of them are going to	12:36:10
20	be closer to zero, some of them are going to be	12:36:12
21	closer to 100 percent, and 50 percent is one	12:36:14
22	way to capture the middle of that.	12:36:17
23	Q. Understood. So under your model,	12:36:19
24	during the download process, you're assuming a	12:36:23
25	constant 50 percent probability that Meta has a	12:36:28

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1	piece that another peer wants during the entire	12:36:33
2	download, correct?	12:36:36
3	A. Not exactly how I would phrase it.	12:36:37
4	Q. You can correct me.	12:36:40
5	A. So for each peer, at each interval	12:36:45
6	that an unchoke decision is made, I'm assuming	12:36:49
7	for Meta there's a 50 percent chance at that	12:36:53
8	moment that it has a piece that that peer	12:36:56
9	wants, and a 50 percent chance that that peer	12:36:59
10	has a piece that Meta wants.	12:37:02
11	This decision is evaluated	12:37:04
12	independent -- in this model, this decision is	12:37:07
13	evaluated independently by each pair of peers	12:37:09
14	with Meta always being one, and then a	12:37:11
15	different peer being the other in each of those	12:37:13
16	eight unchoke slots.	12:37:18
17	Q. So in order for the model to work,	12:37:19
18	when you start the download and Meta has zero	12:37:23
19	pieces at this point, the model still assumes	12:37:28
20	that Meta -- it's a 50 percent chance that Meta	12:37:30
21	has a piece that another peer wants, correct?	12:37:36
22	MR. STEIN: Object as to form.	12:37:37
23	A. That's not exactly how the model	12:37:38
24	works, because it doesn't simulate time. It is	12:37:41
25	equally representing the cases where Meta	12:37:45

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1	starts at zero and right before where it has	12:37:46
2	100 percent and starts seeding.	12:37:49
3	Q. And the 50 percent statistic, what	12:37:51
4	was the -- beyond it just being halfway between	12:38:00
5	zero and 100, what was the process by which you	12:38:03
6	came up with the 50 percent on -- which I guess	12:38:07
7	is applying to both of the peers in this	12:38:11
8	situation?	12:38:13
9	A. It's the same reasoning for both.	12:38:13
10	I am not trying to assume much about where in	12:38:17
11	the download process any given peer is, and so	12:38:20
12	I know that the range of values could be	12:38:25
13	between zero and 100 percent, and so I chose 50	12:38:27
14	percent as a middle ground to represent the	12:38:31
15	average case between those extremes.	12:38:34
16	Q. What's an example in practical	12:38:36
17	sense of where you would suspect that the	12:38:44
18	percentage that another peer wants a piece that	12:38:51
19	Meta has is 50 percent -- I messed that up. I	12:38:56
20	apologize.	12:39:01
21	Can you give me an example of	12:39:02
22	where the likelihood of a peer wanting a piece	12:39:03
23	that Meta has is not 50 percent and they are in	12:39:10
24	one of the unchoke slots?	12:39:14
25	MR. STEIN: Object as to form.	12:39:15

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 1            A.    Well, again, the model doesn't      12:39:16

 2     look at individual cases like that.  The model   12:39:20

 3     is trying to do averages across cases.           12:39:22

 4                  But if you're switching now from    12:39:24

 5     the model to an individual case, then the        12:39:26

 6     probability of 50 percent -- sorry, are you      12:39:30

 7     asking when would be less than 50 percent?  So   12:39:33

 8     that would be when -- now we're in the           12:39:37

 9     probability space.  Now it's the actual          12:39:41

10     percent.                                         12:39:44

11                  So sorry, I just sort of need to    12:39:45

12     go back on my answer to say when we're talking   12:39:49

13     about individual cases, we're not talking about  12:39:53

14     probabilities anymore.  Either there is mutual   12:39:55

15     interest or there isn't.                         12:40:00

16            Q.    And the unchoke slots and the       12:40:02

17     mutual interest analysis that you provide, that  12:40:37

18     would only applied to other leechers, correct?   12:40:40

19            A.    Correct.  Unchoke slots are not     12:40:42

20     for seeders, because seeders aren't downloading  12:40:48

21     from a peer.                                      12:40:51

22            Q.    Because they already have a         12:40:52

23     complete torrent payload, correct?              12:40:53

24            A.    Correct.                            12:40:55

25                  MR. WEINSTEIN:  I'd like to mark    12:41:26
```

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1	the next exhibit in order a three-page	12:41:27
2	document that is, I will represent, is	12:41:30
3	an excerpt of the files that were	12:41:31
4	provided with the Frederiksen-Cross	12:41:33
5	report dated February 10, 2025. Let me	12:41:36
6	know when you have that.	12:41:39
7	(Document marked as Exhibit 4	12:41:40
8	for identification)	12:42:09
9	MR. STEIN: While this is being	12:42:09
10	marked, I'd just like to object to the	12:42:10
11	extent that we don't know exactly what	12:42:12
12	has been included or excluded from this,	12:42:14
13	although I trust that it is an excerpt	12:42:20
14	from the report. We also can't verify	12:42:23
15	that without the report in front of us	12:42:26
16	either.	12:42:28
17	MR. WEINSTEIN: I appreciate the	12:42:30
18	objection. I'll represent that this	12:42:31
19	exhibit is a three-page document. Each	12:42:33
20	page is simply the first excerpt of the	12:42:36
21	file that's provided.	12:42:39
22	The first one is from Internet	12:42:41
23	Archive; the second one is from the	12:42:43
24	Libgen portion; and the third one is	12:42:45
25	from Z-Lib. And I believe it's the very	12:42:47

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1	first files in the list. But your	12:42:51
2	objection is noted for the record.	12:42:57
3	Q. I guess the question I have for	12:42:59
4	the witness is, do you recognize these as the	12:43:01
5	type of data that was provided with the	12:43:02
6	Frederiksen-Cross report?	12:43:07
7	A. I did not spend any time looking	12:43:11
8	at the files, file paths, names or anything	12:43:14
9	like that in her report.	12:43:17
10	Q. Okay. That's fair. That's kind	12:43:19
11	of all I wanted to ask.	12:43:21
12	Looking at this first one, do you	12:43:35
13	recognize this as, you know, as sort of an	12:43:36
14	expert who uses Linux, you recognize this as a	12:43:37
15	file listing, correct?	12:43:42
16	A. This does look like a file	12:43:43
17	listing, yes.	12:43:45
18	Q. And includes the date, size, and	12:43:46
19	then a path name, correct?	12:43:47
20	A. It's a date, although I don't know	12:43:48
21	which date. And, yes, a file size, I don't	12:43:53
22	know if that's in bytes or not. And then, yes,	12:43:55
23	it does look like a path to a file name.	12:43:57
24	Q. Okay.	12:44:00
25	A. Again, I don't know the provenance	12:44:03

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1	of this document, so it's hard for me to verify	12:44:06
2	any of this.	12:44:09
3	Q. Right. Because you didn't spend	12:44:14
4	time looking at the file that was provided with	12:44:16
5	the report, correct?	12:44:18
6	A. That, and I don't know how they	12:44:19
7	were generated. We can still proceed. I just	12:44:20
8	wanted to put it on the record that I'm just	12:44:26
9	looking at some text that includes what looks	12:44:28
10	like a date, and then there's a number that I	12:44:31
11	believe for purposes of this discussion we'll	12:44:33
12	say is a file size, and then it's a path to a	12:44:38
13	file.	12:44:40
14	That's what I think this contains,	12:44:42
15	but I don't actually have enough context to	12:44:44
16	know how it was generated or under what	12:44:47
17	conditions, and so forth. And this applies	12:44:52
18	obviously to all three pages.	12:44:56
19	Q. Understood. I assumed as such.	12:44:58
20	A. Okay. It's a lot of text. I was	12:45:05
21	just trying to take another quick look, but I'm	12:45:07
22	ready for your next question whenever you're	12:45:10
23	ready.	12:45:11
24	Q. You can put this document to the	12:45:37
25	side for now. If you could go to Paragraph 24	12:45:39

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1	of your report, which is marked as Exhibit 1.	12:46:05
2	A. Okay.	12:46:08
3	Q. You calculate what you say is a	12:46:08
4	"probability that Meta shared at least one	12:46:11
5	piece of Plaintiffs' works," correct?	12:46:13
6	A. Correct.	12:46:15
7	Q. We talked earlier about the fact	12:46:21
8	that pieces are actually broken up into blocks,	12:46:23
9	correct?	12:46:28
10	A. Correct.	12:46:29
11	Q. Is your probability that Meta	12:46:29
12	uploaded every -- withdrawn.	12:46:33
13	With respect to the at least one	12:46:37
14	piece of Plaintiffs' works that you contend was	12:46:39
15	likely shared, is it your probability that	12:46:42
16	every block within that piece was shared by	12:46:45
17	Meta?	12:46:49
18	A. I think I would -- what's the best	12:46:49
19	way to phrase this. So I know that in the	12:46:58
20	declaration from Frederiksen-Cross, the most	12:47:02
21	recent one, she mentions that the analysis	12:47:05
22	should have been done on a block level, which I	12:47:08
23	agree with, but I did not have the statistics	12:47:10
24	about the percents of blocks in Plaintiffs'	12:47:13
25	work, so I used pieces. And revisiting this	12:47:16

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1	with blocks would be another kind of analysis	12:47:21
2	that I would be happy to do if that kind of	12:47:24
3	analysis were to be accepted as an amendment to	12:47:27
4	this report.	12:47:31
5	But given the information that I	12:47:32
6	had available, which was from	12:47:34
7	Frederiksen-Cross's report, I used pieces in	12:47:36
8	this analysis, even though it would be more	12:47:38
9	precisely calculated with blocks.	12:47:41
10	Q. Understood, sir. Were you not	12:47:45
11	able to determine the blocks from the	12:47:47
12	information in Frederiksen-Cross's report?	12:47:50
13	MR. STEIN: Object as to form.	12:47:53
14	A. I don't recall seeing statistics	12:48:00
15	about percent of blocks in her reports, though	12:48:01
16	it's possible that I missed that.	12:48:03
17	Q. But the block sizes in libtorrent	12:48:05
18	is a known value, correct?	12:48:16
19	MR. STEIN: Object as to form.	12:48:17
20	A. It's not known to me. I didn't do	12:48:18
21	that analysis.	12:48:20
22	Q. Okay. Understood. Let me ask	12:48:28
23	this question.	12:48:29
24	As far as the analysis that was	12:48:30
25	conducted for your report, you say that "Meta	12:48:31

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1	shared at least one piece of Plaintiffs'	12:48:35
2	works."	12:48:37
3	A. Mm-hmm.	12:48:37
4	Q. Is that a particular work or is	12:48:38
5	that just one piece of one of the works in	12:48:43
6	play?	12:48:45
7	MR. STEIN: Object as to form.	12:48:45
8	A. So I would say in my analysis,	12:48:48
9	it's whether a BitTorrent piece, because that's	12:48:53
10	what I focused on in this analysis, contained	12:48:58
11	any portion of at least one Plaintiff's work,	12:49:01
12	as calculated for the percent of pieces	12:49:05
13	contained in Plaintiffs' work that I took from	12:49:08
14	the Frederiksen-Cross report.	12:49:11
15	Q. Understood, sir. Now, as far as	12:49:15
16	the works at issue, you're aware that there are	12:49:20
17	something close to 50 works at issue, correct?	12:49:24
18	MR. STEIN: Object as to form.	12:49:28
19	A. I don't know the precise number,	12:49:29
20	but it is not zero and it's not a million. 50	12:49:30
21	sounds like a reasonable possibility.	12:49:35
22	Q. I think it's around 49. But you	12:49:37
23	know it's at least somewhere between 40 and 50?	12:49:40
24	A. That sounds about right. I don't	12:49:42
25	have the precise number either.	12:49:43

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1	Q. Understood. And that's spread out	12:49:45
2	among 13 Plaintiffs, correct?	12:49:50
3	A. Actually, I don't know the exact	12:49:52
4	number of Plaintiffs either. But again, if	12:49:53
5	it's helpful, we can sort of assume that for	12:49:56
6	now.	12:49:58
7	Q. Okay. Now, when you say that	12:49:58
8	"Meta shared at least one piece of Plaintiffs'	12:50:07
9	works," is there a particular work that	12:50:10
10	probability relates to?	12:50:16
11	MR. STEIN: Object as to form.	12:50:17
12	A. So the probability analysis	12:50:19
13	doesn't pinpoint which work was shared. It	12:50:21
14	just indicates the likelihood that at least one	12:50:25
15	of those works was shared.	12:50:29
16	Q. Understood. But you hadn't	12:50:31
17	provided an opinion as to the probability that	12:50:35
18	Meta shared at least one piece of each of the	12:50:37
19	Plaintiffs' works, correct?	12:50:42
20	MR. STEIN: Object as to form.	12:50:46
21	A. That wasn't the scope of my	12:50:47
22	analysis. The scope of my analysis was at	12:50:48
23	least one piece of at least one Plaintiff's	12:50:50
24	works.	12:50:52
25	Q. Understood. And then how about at	12:50:53

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1	least one piece of like a handful of	12:51:02
2	Plaintiffs' works, did you calculate a	12:51:05
3	probability that Meta shared pieces of a	12:51:07
4	handful of Plaintiffs' works with -- I may just	12:51:13
5	rephrase the question, because it's getting	12:51:24
6	kind of garbled.	12:51:26
7	So when you say that Meta shared	12:51:29
8	at least one piece of Plaintiffs' works that's	12:51:31
9	a probability you provided for all three data	12:51:34
10	sets, correct?	12:51:36
11	A. Correct. I did provide those	12:51:36
12	probabilities separately for the three data	12:51:37
13	sets, because they had different percent of	12:51:40
14	pieces containing Plaintiffs' works, so that's	12:51:41
15	why I treated them separately.	12:51:44
16	Q. Understood. So you're not giving	12:51:47
17	me the opinion about the probability that Meta	12:51:48
18	shared each of the Plaintiff's works, correct?	12:51:51
19	A. Correct. My probability analysis	12:51:54
20	does not distinguish that.	12:51:56
21	Q. Okay. And you're not giving an	12:51:58
22	opinion about the probability that Meta shared	12:52:00
23	more than one of the works, correct?	12:52:02
24	MR. STEIN: Object as to form.	12:52:04
25	A. The analysis here speaks only to	12:52:05

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1	the probability of sharing at least one,	12:52:11
2	because that's what makes the math easier.	12:52:13
3	There is, of course, other evidence that has	12:52:16
4	come to light that could change the way that	12:52:18
5	that -- the outcome of that kind of analysis.	12:52:20
6	Q. But as far as the report goes, the	12:52:24
7	probability --	12:52:31
8	A. The report is focused on the	12:52:32
9	probability of at least one piece. It could	12:52:36
10	have been from any of the Plaintiff's works.	12:52:39
11	Q. Okay. Sir, if you could turn to	12:52:46
12	Paragraph 32 of your report.	12:53:34
13	A. I'm there.	12:53:38
14	Q. I think this is the only reference	12:53:39
15	to the Krein report in your report?	12:53:41
16	A. That sounds right.	12:53:45
17	Q. You mention in Paragraph 32 and	12:53:46
18	33, you mention the presence of a comment in a	12:53:52
19	source code file.	12:53:59
20	Do you see that?	12:54:01
21	A. Yes.	12:54:02
22	Q. First of all, as a computer	12:54:05
23	programmer, you do agree that a comment is not	12:54:07
24	actually part of the code that's executed for	12:54:10
25	the software, correct?	12:54:12

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1	MR. STEIN: Object as to form.	12:54:12
2	A. Yes, in this case, the comments	12:54:13
3	would not execute any code when that script was	12:54:21
4	run.	12:54:27
5	Q. Right. And then in Paragraph 33	12:54:27
6	you say, "Generally speaking, programmers do	12:54:46
7	not provide such specific working commands as	12:54:48
8	examples unless they have tested them first,	12:54:54
9	i.e., they have run the command in the	12:54:56
10	comment."	12:54:58
11	Do you see that?	12:54:59
12	A. Yes.	12:55:00
13	Q. Obviously, you don't have any	12:55:00
14	direct evidence that the actual command was	12:55:08
15	actually run, correct?	12:55:10
16	MR. STEIN: Object as to form.	12:55:11
17	A. I have seen recently produced	12:55:12
18	evidence that indicates Libgen fiction was, in	12:55:14
19	fact, torrented.	12:55:17
20	Q. We're talking about the analysis	12:55:18
21	in your report from 2024 torrenting?	12:55:20
22	A. I'm speaking about 2024	12:55:22
23	torrenting. We have recently produced evidence	12:55:25
24	that Libgen fiction was included in the set of	12:55:28
25	libraries that were torrented from Anna's	12:55:33

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1   Archive, and that might explain why the comment   12:55:37

2   was there.   12:55:40

3   Q.   Okay. Well, let me ask you to go   12:55:40

4   to Paragraph 39, then, because that may be my   12:55:44

5   confusion on this.   12:55:47

6   A.   Okay.   12:55:50

7   Q.   Paragraph 39 you refer to Libgen   12:55:50

8   download details, and you say "Libgen" --   12:55:55

9   you're quoting from a document. "'Libgen (10   12:55:59

10   TB out of 10 TB): We got almost all we want   12:56:04

11   ... with a few ones pending.'"   12:56:09

12   Do you see that?   12:56:13

13   A.   Yes.   12:56:15

14   Q.   Let's focus on your report and not   12:56:15

15   whatever may or may not come up after your   12:56:16

16   report. What was the discrepancy that you were   12:56:18

17   identifying in Paragraph 39 of your report?   12:56:20

18   A.   The discrepancy is that it was my   12:56:22

19   understanding that this was Libgen fiction,   12:56:25

20   which the Frederiksen-Cross report indicates   12:56:29

21   was not included in torrent data.   12:56:31

22   MR. WEINSTEIN: If we could mark   12:56:51

23   as the next exhibit in order a copy of   12:56:52

24   the Frederiksen-Cross rebuttal report,   12:56:55

25   dated February 10, 2025.   12:56:59

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1	(Document marked as Exhibit 5	12:57:32
2	for identification)	12:57:33
3	Q. In Paragraph 39 of your report,	12:57:33
4	you quoted a document that refers to 10 TB of	12:57:36
5	Libgen.	12:57:44
6	Do you see that?	12:57:45
7	A. Yes.	12:57:45
8	Q. You've also been handed a copy of	12:57:46
9	the Frederiksen-Cross report as an exhibit,	12:57:48
10	correct?	12:57:50
11	A. Yes.	12:57:51
12	Q. If you could turn to Page 49 of	12:57:53
13	that report.	12:57:55
14	A. All right. I'm there.	12:58:03
15	Q. Do you see Table 3, and it refers	12:58:06
16	to "Total Size of Downloaded Dataset." For	12:58:08
17	Libgen.rs Non-Fiction was 10.3 TB?	12:58:16
18	A. I do see that.	12:58:16
19	Q. I'm just curious,	12:58:17
20	Frederiksen-Cross reports that the amount of	12:58:19
21	downloaded Libgen data was about ten terabytes.	12:58:21
22	The document you cite in Paragraph 39 of your	12:58:24
23	report says that it was about ten terabytes.	12:58:26
24	I'm just trying to understand,	12:58:29
25	when you wrote your report and you said there	12:58:31

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1	was a discrepancy, what was the discrepancy to	12:58:32
2	which you were referring?	12:58:35
3	MR. STEIN: Object as to form.	12:58:37
4	A. I suppose the comment did not	12:58:38
5	specify that it was nonfiction, Scitech only.	12:58:44
6	So the question is whether that might have been	12:58:51
7	a different data set. It was not included in	12:58:53
8	the Frederiksen-Cross report.	12:59:03
9	Q. But the file list was created, and	12:59:04
10	the file list that was associated with that	12:59:05
11	downloaded data, was, in fact, included with	12:59:08
12	her reports, correct?	12:59:12
13	MR. STEIN: Object as form.	12:59:13
14	Q. We saw a portion of that earlier.	12:59:14
15	A. Okay. Then, yes, I guess the file	12:59:16
16	list was included with the report.	12:59:19
17	Q. Did you look at the file list to	12:59:21
18	see whether or not the files that were reported	12:59:23
19	pertained to Libgen fiction versus Libgen	12:59:29
20	nonfiction?	12:59:35
21	A. I did not, because with the	12:59:36
22	vagueness of the comments, and not knowing	12:59:38
23	enough about, as I sit here, the dates when	12:59:43
24	this comment was posted, versus the dates when	12:59:47
25	this Libgen.rs nonfiction was downloaded, I	12:59:52

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1	don't know if those are consistent.	12:59:55
2	So that explains my concern about	01:00:00
3	that particular comment is that I wasn't sure	01:00:02
4	what it corresponded to. I don't have -- I	01:00:04
5	don't have enough information to conclude what	01:00:13
6	it corresponds to.	01:00:13
7	So it's possible that both getting	01:00:15
8	clarification from the person who made that	01:00:18
9	comment, I'm reconciling that with the file	01:00:20
10	list in Frederiksen-Cross's report would	01:00:22
11	resolve that issue. I just don't know. That's	01:00:26
12	not information -- I didn't have that kind of	01:00:28
13	confirmation available to me.	01:00:31
14	Q. Understood. And in Paragraph 37	01:00:32
15	of your report, it's on the same page, you say	01:00:36
16	"Information about when torrented data files	01:00:42
17	were created, and when they were last modified,	01:00:44
18	can identify the period when downloading was	01:00:49
19	occurring. This information has not provided."	01:00:53
20	Again, this may have been	01:00:56
21	oversight on your part. But you'd agree that	01:00:57
22	the files do contain date information relating	01:01:00
23	to the torrent files, correct?	01:01:01
24	MR. STEIN: Object as to form.	01:01:02
25	A. So what I'm asking for is both the	01:01:03

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1   date of creation and the date of last modified.   01:01:08

2   All of the file lists I've received contain one   01:01:10

3   date. They cannot be the same if they were   01:01:14

4   truly torrented.   01:01:20

5   So I have yet to get any   01:01:21

6   clarification as to which one they are, if it's   01:01:22

7   file creation time, last modified time, or even   01:01:26

8   a different time, for instance, when they were   01:01:29

9   copied to S3. So I cannot rely on that single   01:01:32

10   date for anything related to, in this case,   01:01:38

11   trying to estimate how long each torrent   01:01:40

12   download took.   01:01:42

13   Q.   So what would be the importance of   01:02:04

14   having both the creation date and the   01:02:06

15   modification date in terms of identifying the   01:02:07

16   approximate time period in which a torrent   01:02:09

17   download took place?   01:02:11

18   A.   So typically when a torrent starts   01:02:14

19   it creates the file that the payload goes into.   01:02:17

20   That gives you the start of the download. And   01:02:21

21   typically when the last piece is downloaded and   01:02:22

22   added to that file, that becomes the last date   01:02:24

23   on which it's modified.   01:02:26

24   So those give you bounds on the   01:02:27

25   start and end time for any particular torrent   01:02:30

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1	download.	01:02:32
2	Q. I understand, sir. But you are	01:02:32
3	assuming as part of your analysis that the	01:02:34
4	torrent download took about an hour, correct?	01:02:36
5	MR. STEIN: Object as to form.	01:02:38
6	A. For the sake of producing an	01:02:40
7	estimate, assumed on average one hour across	01:02:45
8	all torrents. This -- the point I'm making in	01:02:48
9	Paragraph 37 is that I could make it more	01:02:54
10	accurate. I don't know if that means that the	01:02:55
11	time would go up or down, but it is an	01:02:59
12	assumption that I had to make, because I had	01:03:02
13	very limited information available with which	01:03:04
14	to make that assumption, and this is me	01:03:07
15	requesting that additional information that's	01:03:12
16	available in file systems, but has not been	01:03:13
17	produced to me as of this date.	01:03:15
18	Q. Dr. Choffnes, you also talked	01:03:16
19	about the concept of mutual interests, correct,	01:04:43
20	as it relates to --	01:04:46
21	A. Yes.	01:04:48
22	Q. We can go to Paragraph 21 if you'd	01:04:48
23	like.	01:04:51
24	A. Of my report, I assume?	01:04:52
25	Q. Yes, sir. You can put the other	01:04:54

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1	report down.	01:04:56
2	A. All right. I'm there.	01:05:03
3	Q. In Paragraph 21 you say that "the	01:05:04
4	peer is unchoked due to mutual interest." Let	01:05:07
5	me just make sure to set the ground as far as	01:05:10
6	like in BitTorrent, what does "mutual interest"	01:05:13
7	refer to?	01:05:16
8	A. Sure. In this case, it's	01:05:16
9	referring to the fact that two leechers that	01:05:20
10	are connected to each other each have pieces of	01:05:23
11	the payload that the other does not have.	01:05:25
12	Therefore, they're interested in each other and	01:05:27
13	they are good candidates to exchange data with	01:05:30
14	each other because they will both benefit from	01:05:34
15	that.	01:05:37
16	Q. And in terms of unchoking, are you	01:05:37
17	familiar with something called a tit for tat	01:05:41
18	strategy?	01:05:43
19	A. Yes.	01:05:45
20	Q. In the context of BitTorrent, what	01:05:45
21	does tit for tat mean?	01:05:47
22	A. It's been construed in a number of	01:05:53
23	different ways. I will also say that from the	01:05:56
24	academic literature, the way tit for tat is	01:05:58
25	described by the creators of BitTorrent does	01:06:00

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1	not necessarily properly capture everything	01:06:03
2	that BitTorrent does.	01:06:04
3	With that preface, I will say that	01:06:05
4	the idea of tit for tat is that if you upload	01:06:08
5	to a peer, they will let you download from	01:06:10
6	them. If you download without uploading to	01:06:13
7	them, then they will retaliate by not sending	01:06:16
8	you data and vice versa. That's the colloquial	01:06:20
9	understanding of tit for tat.	01:06:31
10	BitTorrent is a dynamic system,	01:06:31
11	and there's other factors at play. There's a	01:06:33
12	research paper, for example, that says	01:06:33
13	BitTorrent is an option, and I don't know that	01:06:36
14	it's particularly relevant to this, but I just	01:06:39
15	wanted to put that out there that we can talk	01:06:41
16	about tit for tat, and I can tell you the	01:06:43
17	simple terms about it, but there are studies of	01:06:47
18	the protocol that sort of amend the basic	01:06:52
19	nature of tit for tat.	01:06:54
20	Q. When a BitTorrent client is	01:06:55
21	downloading pieces and blocks of pieces, is it	01:07:11
22	getting -- start with the pieces. Is getting	01:07:19
23	pieces from multiple different peers on the	01:07:21
24	network?	01:07:24
25	A. It can. It doesn't have to. It	01:07:24

1	goes back to are there peers available that	01:07:28
2	have pieces that it wants to download from. If	01:07:32
3	the answer is yes, and if they are willing to	01:07:35
4	upload to that client -- sorry, to that peer,	01:07:37
5	then presumably they're going to be downloading	01:07:39
6	from multiple peers at once.	01:07:45
7	Q. Understood. And then within	01:07:46
8	pieces there are blocks, correct?	01:07:49
9	A. Correct.	01:07:50
10	Q. Can the client be getting multiple	01:07:50
11	blocks within those peers from multiple	01:07:56
12	different -- withdrawn. I messed that question	01:08:00
13	up.	01:08:04
14	Can the client download multiple	01:08:04
15	blocks within the piece from multiple different	01:08:07
16	peers?	01:08:10
17	A. I think so.	01:08:11
18	Q. What is the -- obviously somewhat	01:08:11
19	simultaneously, correct?	01:08:21
20	A. Correct.	01:08:22
21	Q. Now, at some point all of the	01:08:23
22	blocks associated with the piece had been	01:08:28
23	received by a client, correct?	01:08:30
24	A. Sure, assuming that happens, yes,	01:08:33
25	assuming that they have already downloaded all	01:08:37

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1	of those blocks and that they were available	01:08:39
2	the whole time, of course there are exceptions	01:08:43
3	where that might not happen, if all of a sudden	01:08:45
4	all of those disappear, or something, a network	01:08:49
5	breaks.	01:08:50
6	But I assume you want to get to	01:08:53
7	the point of they have received all of the	01:08:53
8	blocks of the piece. So we can start there.	01:08:54
9	Q. Once the client receives all the	01:08:57
10	blocks of the piece, what does it do at that	01:09:00
11	point?	01:09:06
12	A. My understanding is that piece is	01:09:06
13	written to disk or wherever you've specified	01:09:08
14	the file be stored.	01:09:11
15	Q. Before all the blocks of a piece	01:09:12
16	had been received by a BitTorrent client, is	01:09:15
17	the data usable to the user as far as you know?	01:09:20
18	A. As far as I know, if it's not yet	01:09:24
19	written to disk, it's not something that the	01:09:32
20	user can use at that moment.	01:09:33
21	Q. Okay.	01:09:35
22	MR. WEINSTEIN: Why don't we take	01:10:03
23	like a five-minute break if that's okay	01:10:05
24	with you guys. We're getting close.	01:10:07
25	THE VIDEOGRAPHER: We're now going	01:10:09

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1	off the record. The time is 1:09 p.m.	01:10:11
2	(Recess taken at 1:09 p.m. and	01:10:13
3	reconvening at 1:22 p.m.)	01:10:16
4	THE VIDEOGRAPHER: We are now back	01:22:35
5	on the record. The time is 1:22 p.m.	01:22:44
6	BY MR. WEINSTEIN:	01:22:47
7	Q. Welcome back, Dr. Choffnes.	01:22:47
8	A. Thank you.	01:22:50
9	Q. We talked earlier today about the	01:22:51
10	probabilities that you present in your report	01:22:55
11	as to whether Meta shared at least one piece of	01:22:58
12	Plaintiffs' works, correct?	01:23:02
13	A. Correct.	01:23:03
14	Q. Do those probabilities assume that	01:23:03
15	Meta uploaded the entirety of that at least one	01:23:06
16	piece?	01:23:11
17	MR. STEIN: Objection as to form.	01:23:15
18	A. So in my analysis, which was based	01:23:16
19	on pieces, my assumption was that the unit of	01:23:20
20	data transfer was pieces. In reality, it's	01:23:25
21	blocks, and, you know, so the assumption was	01:23:29
22	simplified because of the -- I was using the	01:23:33
23	data available from Frederiksen-Cross's report.	01:23:36
24	If I were allowed to amend the	01:23:40
25	report, I would run the same statistical	01:23:42

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1	analysis, but use the block level data that she	01:23:46
2	provides in her declaration. So in that case I	01:23:48
3	wouldn't have to assume that the entire piece	01:23:51
4	was transferred, which instead it's blocks that	01:23:53
5	are transferred.	01:23:56
6	Q. Could you determine -- I don't	01:23:56
7	want to be argumentative here, but could you	01:24:01
8	have determined the block level information	01:24:03
9	before you did your report?	01:24:05
10	MR. STEIN: Objection as to form.	01:24:06
11	A. It may have been feasible. I did	01:24:08
12	not have any -- for example, I didn't have any	01:24:14
13	code that does this for me or anything like	01:24:16
14	that. So I would have presumably had to find a	01:24:18
15	way to generate that information myself.	01:24:22
16	Q. But the downloaded -- the torrent	01:24:23
17	size and the block size, though -- I'm sorry,	01:24:31
18	the torrent size and the piece size was known,	01:24:33
19	correct?	01:24:38
20	MR. STEIN: Objection as to form.	01:24:38
21	A. So my analysis doesn't really	01:24:40
22	depend on the torrent size or the piece size.	01:24:44
23	I agree that that information could be	01:24:48
24	obtained.	01:24:50
25	Q. Okay. And then to determine the	01:24:51

1	number of blocks, you could do some pretty	01:24:52
2	simple math to figure out the block level	01:24:55
3	analysis, correct?	01:24:58
4	MR. STEIN: Objection as to form.	01:24:58
5	A. That part is easy. The hard and	01:24:59
6	more important part is the fraction of blocks	01:25:02
7	containing Plaintiffs' work. That would	01:25:05
8	require knowing all of the Plaintiffs' works	01:25:09
9	and how those mapped to pieces, and then within	01:25:12
10	those pieces how that maps to individual	01:25:15
11	blocks, and that is not an analysis that I did,	01:25:18
12	but I understand it is an analysis in the	01:25:20
13	Frederiksen-Cross declaration that was recently	01:25:22
14	filed after my report.	01:25:25
15	Q. Understood. Now, with respect to	01:25:26
16	your one-hour assumption that you make for the	01:25:30
17	probabilities, did you rely on any empirical	01:25:35
18	data for that assumption?	01:25:37
19	MR. STEIN: Object as to form.	01:25:39
20	A. As I stated in the footnote, there	01:25:40
21	was information from -- sorry, information from	01:25:43
22	the produced documents at the time of my report	01:25:48
23	that indicated that it was taking weeks to	01:25:51
24	download. I used that as a ballpark figure to	01:25:54
25	come up with a time it could have taken to	01:25:58

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1	download any individual torrent.	01:26:00
2	Of course since then, there's been	01:26:06
3	more evidence that gives us a tighter timeline,	01:26:08
4	including the amount of data that was	01:26:11
5	transferred on any given day, like how much was	01:26:13
6	uploaded by Meta, how much was downloaded to	01:26:15
7	Meta's EC2 instances, but that wasn't available	01:26:18
8	at the time of my report.	01:26:21
9	Q. Okay. The last line of questions	01:26:24
10	are questions that I don't like asking, but I	01:26:26
11	feel like I have to ask, because I'm sort of	01:26:28
12	the lawyer for Meta.	01:26:30
13	Prior to your work in this case,	01:26:31
14	did you harbor any negative views about Meta as	01:26:34
15	a company?	01:26:37
16	A. I am a privacy researcher. And so	01:26:37
17	as someone who values privacy and has seen some	01:26:42
18	of the claims in cases against Meta in terms of	01:26:45
19	the behavior related to privacy, I'm not happy	01:26:51
20	about that.	01:26:53
21	That said, of course, my view	01:26:57
22	about that does not implicate my analysis of	01:26:58
23	BitTorrent.	01:27:04
24	Q. I understand. But you did harbor	01:27:04
25	negative views about Meta before your work in	01:27:07

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1	this case, correct?	01:27:09
2	MR. STEIN: Object as to form, to	01:27:10
3	the extent we're talking about something	01:27:12
4	like negative views, which I believe is	01:27:13
5	vague.	01:27:17
6	A. Yeah, I haven't conceded that. I	01:27:17
7	will also say that I know a lot of people who	01:27:20
8	work at Meta who I like. So to say that I	01:27:22
9	harbor negative views towards something as	01:27:26
10	amalgamous of an entire company is not	01:27:30
11	something that I can admit to.	01:27:33
12	MR. WEINSTEIN: I think with that,	01:27:49
13	I'm going to pass the witness at this	01:27:50
14	point. Subject to other questions, I	01:27:51
15	want to thank you very much for	01:27:54
16	appearing here today.	01:27:56
17	MR. MORTON: Mark, do we want to	01:27:58
18	mark the transcript?	01:28:00
19	MR. WEINSTEIN: Well, there's no	01:28:02
20	follow-up, as far as I can tell?	01:28:04
21	MR. STEIN: I will have a few	01:28:06
22	questions.	01:28:07
23	MR. WEINSTEIN: I think we can do	01:28:12
24	the designations at the end of the	01:28:15
25	deposition, before we go off the record.	01:28:17

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1	EXAMINATION BY	01:28:23
2	MR. STEIN:	01:28:24
3	Q. Dr. Choffnes, thanks for appearing	01:28:24
4	today. I just have a couple of questions for	01:28:26
5	you following up on your testimony thus far.	01:28:28
6	First, I want to confirm that you	01:28:33
7	understand you're under oath today?	01:28:38
8	A. I do.	01:28:39
9	Q. And I also want to see if with	01:28:40
10	respect to the report that you submitted, which	01:28:45
11	is Exhibit 1 in today's deposition, that today	01:28:49
12	you can swear that as of February 26, 2025 your	01:28:54
13	report is true and accurate to the best of your	01:28:59
14	belief under penalty of perjury?	01:29:02
15	A. Yes.	01:29:04
16	Q. And that you would confirm that	01:29:04
17	you would testify consistent with the report's	01:29:08
18	contents as of February 26, 2025 if called upon	01:29:11
19	to do so at trial?	01:29:14
20	A. Yes.	01:29:15
21	Q. And you'll note that I mentioned	01:29:16
22	the date of that report, February 26th. If	01:29:18
23	asked to supplement or rewrite that report,	01:29:24
24	would you have any grounds to do so as of	01:29:27
25	today?	01:29:29

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1   A.   Yes. There's been some additional   01:29:30

2   evidence that came to light. So one thing, as   01:29:33

3   I mentioned during the deposition --   01:29:37

4   MR. WEINSTEIN: I'm going to   01:29:39

5   object on scope here. I don't mean to   01:29:40

6   interrupt here. I just want to make an   01:29:42

7   objection to scope here.   01:29:44

8   Mr. Stein, are you asking the   01:29:46

9   witness to supplement his expert report   01:29:49

10   on the fly here?   01:29:51

11   MR. STEIN: I'm not asking him to   01:29:51

12   supplement his report. The report was   01:29:52

13   frequently the subject of questions   01:29:55

14   today. And so with respect to scope, I   01:29:58

15   think it's really important that he   01:30:01

16   state for the record what his report --   01:30:03

17   how his report would be different today   01:30:07

18   than it was on February 26, 2025.   01:30:09

19   MR. WEINSTEIN: So you are going   01:30:13

20   to solicit additional opinions from him

21   right now that are not in his report; is

22   that what you're saying?

23   MR. STEIN: I'm going to ask him

24   how his report would be corrected based

25   on the record differences today. I

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1   don't think that that's a

2   supplementation to use your words. So I

3   disagree there. But I'm asking him to

4   clarify for the record, since the report

5   was the subject of much of today's

6   testimony, what he would change about

7   that report today.

8   MR. STEIN: I don't think that's a

9   difference than what you described

10   between correcting and supplementing. I

11   guess we'll see what the witness says.

12   Obviously we're going to object,

13   that these questions are outside the

14   scope of the examination that was

15   performed earlier today.

16   MR. STEIN: Okay. I note your

17   objection, but I'll ask the witness to

18   answer the question pending.

19   A.   Can I proceed?

20   Q.   Yes, you may proceed.

21   A.   Okay. So one thing is, as we

22   discussed, the analysis uses piece level

23   information. There is now block level

24   information provided by the Frederiksen-Cross.

25   I would update the report in that sense.

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1   The other thing I mentioned is we

2   now know that more torrenting happened than was

3   in the Frederiksen-Cross report, which my

4   report relied on. So there would be more

5   opportunities for Meta to have shared

6   Plaintiffs' work, and that would be reflected.

7   And the last thing is that we have

8   evidence of how much data was uploaded by Meta

9   BitTorrent -- BitTorrenting instances, and I

10   would update the report with those numbers,

11   because in many ways that could even subsume

12   any need for modeling in terms of -- well, not

13   any need, but it would very much strengthen the

14   modeling and the kinds of conclusions that

15   could be drawn about how much was very likely

16   -- how much the Plaintiffs' work was very

17   likely to have been uploaded.

18   COURT REPORTER: Sorry, we have to

19   go off the record.

20   THE VIDEOGRAPHER: We are now

21   going off the record. The time is 1:32.

22   (Off the record at 1:32 p.m. and

23   reconvening at 1:38 p.m.)

24   THE VIDEOGRAPHER: We are now back   01:38:53

25   on the record. The time is 1:38 p.m.   01:38:54

1	BY MR. STEIN:	01:39:00
2	Q. So one thing that --	01:39:00
3	MR. WEINSTEIN: Go ahead. I	
4	didn't know if there was a question	
5	pending or not.	
6	MR. STEIN: Honestly, Counsel, I	
7	can't remember without the realtime in	
8	front of me. I think I'm just going to	
9	start from where I think we were.	
10	Q. You were asked today about the	01:39:21
11	Frederiksen-Cross report with respect to three	01:39:25
12	different data sets, Libgen, Internet Archive	01:39:32
13	and Z-Lib, and I will reference Exhibit 5, Page	01:39:36
14	49, listing those in her report, and you had	01:39:40
15	mentioned that in the Frederiksen-Cross report	01:39:46
16	you saw a reference to nonfiction, but that you	01:39:53
17	now know that Libgen fiction was also	01:39:57
18	torrented?	01:40:02
19	MR. STEIN: I wanted to introduce	01:40:04
20	another exhibit, which we'll mark as	01:40:06
21	Exhibit 6. And I will at this time	01:40:08
22	e-mail it to both counsel, Mr. Weinstein	01:40:14
23	and Mr. Morton, so they can have it in	01:40:20
24	front of them. I will wait for them to	01:40:22
25	confirm receipt electronically.	01:40:36

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1	(Document marked as Exhibit 6	01:41:07
2	for identification)	01:41:09
3	MR. STEIN: Messrs. Weinstein and	01:41:09
4	Morton, have you received that yet?	01:41:11
5	MR. WEINSTEIN: I have not yet.	01:41:12
6	It just came in a second ago. Let me	01:41:16
7	take a look.	01:41:18
8	MR. STEIN: It should be Bates	01:41:19
9	number ending 237286.	01:41:20
10	MR. WEINSTEIN: I see, yes.	01:41:33
11	MR. MORTON: I have it.	01:41:35
12	Q. I just wanted to ask Dr. Choffnes	01:41:35
13	if he has seen this document.	01:41:38
14	A. I have.	01:41:40
15	Q. Okay. And could you just testify	01:41:41
16	as to the data sets here?	01:41:42
17	A. Yes.	01:41:47
18	MR. WEINSTEIN: Object to form.	01:41:48
19	Outside the scope. You can proceed.	01:41:51
20	A. The document refers to torrent	01:41:57
21	files that were already downloaded. That's	01:42:00
22	what it says. And then it provides what looks	01:42:08
23	like there's a directory structure, it starts	01:42:09
24	with "data, aa," which is short for Anna's	01:42:13
25	Archive. Then "index" and under "index,	01:42:13

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1	duxiu," which is one of the Anna's Archives	01:42:22
2	data, book data sets. "ia," which is Internet	01:42:24
3	Archive, "Libgen_li_fic," that should be	01:42:27
4	Libgen.li fiction data set. "Libgen_rs_fic"	01:42:32
5	that should be the Libgen_rs_fiction data set.	01:42:37
6	"Libgen_rs_non_fic," that should be the	01:42:44
7	Libgen_rs nonfiction data set that is in the	01:42:45
8	Frederiksen-Cross report.	01:42:51
9	"Scihub," which is not in the	01:42:53
10	Frederiksen-Cross report, and "Z-Lib" which is.	01:42:55
11	I should say, just again, to	01:42:57
12	clarify for the record, the only three in the	01:42:59
13	Frederiksen-Cross report are IA, Internet	01:43:01
14	Archive, Z-Lib, which is Z-Library, and	01:43:04
15	Libgen_rs_non_fic, those are the three that are	01:43:12
16	in Frederiksen-Cross's analysis and in her	01:43:14
17	report, and the two Libgen fiction data sets,	01:43:18
18	Scihub and Duxiu are not. And this is Chinese,	01:43:22
19	translated into English, D-u-x-i-u, and I think	01:43:32
20	it's pronounced Duxiu.	01:43:36
21	Q. Above that, what is the	01:43:42
22	information here with respect to hosts telling	01:43:44
23	us?	01:43:46
24	A. So under "Hosts" these are ECS	01:43:46
25	instances. They are relatively high capacity	01:43:51

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1	ones. I believe they were the ones that were	01:43:55
2	used for downloading torrented files.	01:43:58
3	Q. Did you have information with	01:44:08
4	respect to these hosts and the activity on	01:44:09
5	these hosts when you provided your report on	01:44:12
6	February 26, 2025?	01:44:14
7	A. I did not have information about	01:44:14
8	these hosts in this level of detail at that	01:44:16
9	time.	01:44:18
10	Q. Now, Mr. Weinstein today asked you	01:44:18
11	about your Bernoulli experiment. Do you recall	01:44:20
12	that?	01:44:24
13	A. I do.	01:44:24
14	Q. If asked today with the	01:44:28
15	information that you have, would you have	01:44:30
16	conducted that Bernoulli experiment as a means	01:44:31
17	of providing your expertise on the torrenting	01:44:34
18	activities of Meta?	01:44:38
19	A. I would have provided that	01:44:39
20	experiment and supplemented it with other	01:44:41
21	empirical evidence that we now have.	01:44:43
22	Q. And what empirical evidence would	01:44:44
23	you supplement that with?	01:44:47
24	A. So as part of --	01:44:48
25	MR. WEINSTEIN: Object to form.	01:44:51

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1	Scope. Go ahead.	01:44:52
2	A. As part of very recent	01:44:53
3	disclosures, we received logs of the amount of	01:44:56
4	data that was transferred to the internet from	01:44:59
5	EC2 instances where Meta torrenting occurred,	01:45:03
6	and the amount of data that was downloaded from	01:45:06
7	the internet to those instances, the vast	01:45:08
8	majority of which it is safe to assume was	01:45:15
9	BitTorrent traffic from the archives that I	01:45:18
10	just mentioned before as an example.	01:45:21
11	Q. And did you study or compile what	01:45:23
12	you learned from that data?	01:45:29
13	A. I did. I did an analysis, which I	01:45:31
14	brought with in case it was needed, of how much	01:45:32
15	data was uploaded or downloaded from these	01:45:40
16	instances each day from March -- sorry, April	01:45:45
17	5th through June 21st of 2024. I have a few	01:45:47
18	copies here.	01:45:50
19	MR. STEIN: Okay. Can we please	01:45:51
20	mark one of those copies as Exhibit 7,	01:45:52
21	and provide another copy to counsel for	01:45:55
22	Meta.	01:45:57
23	MR. WEINSTEIN: Now you're getting	01:46:00
24	into a more dangerous category, Mr.	01:46:02
25	Stein. Before you were asking the	01:46:04

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1	witness what he would do if he had	01:46:05
2	additional information. You're now	01:46:06
3	introducing new expert testimony.	01:46:08
4	I will cite for you docket number	01:46:10
5	499 was entered on March 25th by the	01:46:13
6	Court that makes clear that no further	01:46:17
7	expert testimony is going to be allowed.	01:46:18
8	So while you may wish to seek	01:46:20
9	leave to submit further expert	01:46:22
10	testimony, I think you're running afoul	01:46:26
11	right now of the Court's order in this	01:46:28
12	matter.	01:46:31
13	MR. STEIN: I note your objection.	01:46:33
14	I cite docket 500 with respect to Meta's	01:46:33
15	disclosure obligations, and also note	01:46:39
16	that from what I understand will	01:46:41
17	continue to ask Dr. Choffnes about this.	01:46:42
18	This is merely a compilation of data	01:46:46
19	that's already been provided by Meta and	01:46:48
20	does not present anything new into the	01:46:50
21	record at all. It's more akin to	01:46:54
22	demonstrative than any sort of new	01:46:57
23	evidence or expert testimony.	01:47:00
24	Of course you'll have	01:47:01
25	opportunities to address that once you	01:47:03

1	look at it or move to strike it, and the	01:47:04
2	judge can consider that. But I'm going	01:47:07
3	to proceed to question the witness on it	01:47:10
4	and ask that it be marked as Exhibit 7.	01:47:12
5	MR. WEINSTEIN: We'll take a look	01:47:16
6	at it. Are your going to e-mail it like	01:47:18
7	before?	01:47:24
8	MR. STEIN: We actually have to	01:47:24
9	give it to Phil. We only have hard	01:47:26
10	copy. If he wants to take a break to	01:47:33
11	scan and send it to you, he's welcome	01:47:34
12	to.	01:47:37
13	MR. WEINSTEIN: If you're going to	01:47:41
14	mark the exhibit, again, subject to our	01:47:42
15	continuing objection of this, we	01:47:44
16	probably should take a break to provide	01:47:45
17	that via e-mail since I'm obviously in a	01:47:48
18	remote location.	01:47:52
19	MR. STEIN: Okay. We'll hang	01:47:53
20	tight. We can go off the record for	01:47:56
21	that to allow counsel to send that	01:47:57
22	electronically.	01:48:00
23	THE VIDEOGRAPHER: We are now	01:48:04
24	going off the record. The time is 1:47.	01:48:05
25	(Off the record at 1:47 p.m. and	01:48:25

1	reconvening at 1:52 p.m.)	01:48:30
2	(Document marked as Exhibit 7	01:53:10
3	for identification)	01:53:13
4	THE VIDEOGRAPHER: We are now back	01:53:13
5	on the record. The time is 1:53 p.m.	01:53:24
6	BY MR. STEIN:	01:53:30
7	Q. Dr. Choffnes, you now have Exhibit	01:53:30
8	7 in front of you; is that correct?	01:53:32
9	A. Correct.	01:53:34
10	Q. What is that?	01:53:34
11	A. I took the document that was	01:53:35
12	recently produced with the Bates number ending	01:53:39
13	in 237300, which was a detailed listing of	01:53:42
14	Amazon Web Services charges based on how much	01:53:48
15	data was uploaded or downloaded from the EC2	01:53:51
16	instances that were involved in torrenting.	01:53:54
17	I took that data set and I did --	01:53:57
18	I copied columns -- sorry, I did filtering to	01:54:01
19	focus only on traffic to and from the internet,	01:54:06
20	which would be the BitTorrent traffic, and then	01:54:09
21	I did -- I copied over the inbound traffic into	01:54:12
22	one column, the outbound traffic into another	01:54:14
23	column, both of them with date information on	01:54:17
24	them.	01:54:19
25	And then I aggregated in Excel,	01:54:20

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1	just did the subtotals feature, that told me	01:54:24
2	how much data in gigabytes was uploaded or	01:54:27
3	downloaded by Meta on each day from April 5th	01:54:31
4	through June 21st of 2024.	01:54:36
5	Q. And how do you know which EC2	01:54:41
6	instances were related to torrenting?	01:54:43
7	MR. WEINSTEIN: Object to form.	01:54:46
8	Scope.	01:54:48
9	A. So as part of the production, we	01:54:50
10	were -- my understanding was that this	01:54:59
11	represents those EC2 instances that were used	01:55:01
12	for torrenting. I also confirmed that the data	01:55:03
13	center that this represents is the very same	01:55:08
14	one where those torrenting EC2 instances were	01:55:10
15	set up.	01:55:14
16	So the evidence provided by Meta	01:55:15
17	leads me to believe that this was those very	01:55:18
18	same instances.	01:55:20
19	Q. And what were you able to	01:55:21
20	determine with respect to the amount that was	01:55:24
21	downloaded?	01:55:28
22	MR. WEINSTEIN: Object to form.	01:55:30
23	Scope.	01:55:32
24	A. So what I was able to see is a	01:55:32
25	very large amount of upload traffic, that's the	01:55:37

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1	second column, "Total Outbound Traffic,"	01:55:40
2	particularly during times that we know for sure	01:55:44
3	that Meta was torrenting.	01:55:46
4	As an example, and not exclusive,	01:55:48
5	there are other periods where torrenting was	01:55:50
6	happening. But just looking at the week	01:55:52
7	between April 5th and April 11th alone, Meta	01:55:55
8	uploaded 28 terabytes of data and downloaded	01:55:58
9	170 terabytes of data using those EC2	01:56:03
10	instances.	01:56:06
11	Q. And what did you learn about the	01:56:06
12	percent of data that was downloaded that was	01:56:12
13	uploaded?	01:56:14
14	A. So on average --	01:56:15
15	MR. WEINSTEIN: Objection.	01:56:17
16	A. On average, I see that more than	01:56:18
17	20 percent of the data that was downloaded, the	01:56:24
18	amount of data that was downloaded, was	01:56:27
19	subsequently uploaded, and on some days that	01:56:30
20	percentage was higher.	01:56:33
21	Q. And what do you recall of Meta's	01:56:36
22	expert testimony with respect to that	01:56:41
23	percentage?	01:56:43
24	A. In the Frederiksen-Cross	01:56:45
25	declaration that was recently entered into the	01:56:51

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1	court, she mentions that up to 30 percent of	01:56:54
2	what was downloaded was subsequently uploaded.	01:56:56
3	Q. And in terms of the -- did you get	01:57:00
4	a grand total during this period of downloaded	01:57:06
5	material?	01:57:10
6	MR. WEINSTEIN: Objection.	01:57:12
7	A. So the grand total for the period	01:57:13
8	between April 5th and June 21st that was	01:57:18
9	uploaded was 62 terabytes of data, just under	01:57:22
10	62 terabytes of data, and downloaded was over	01:57:28
11	270 terabytes of data.	01:57:35
12	Q. Now, I think there might be a	01:57:36
13	typographical error in your chart. I see that	01:57:38
14	it's repeated twice, "Total Downloaded." Is	01:57:43
15	that second mention supposed to say "uploaded"?	01:57:46
16	A. Correct. The second one is	01:57:49
17	supposed to say total uploaded during	01:57:52
18	torrenting period, and that's where in	01:57:56
19	parenthesis it says "about 62 terabytes of	01:57:57
20	data."	01:58:00
21	Q. What is a terabyte?	01:58:00
22	A. So a terabyte is a 1,024	01:58:02
23	gigabytes, which is, in turn, 1,024 megabytes.	01:58:06
24	It is a very large number.	01:58:11
25	Q. And if we're talking about books,	01:58:13

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1	do you have a ballpark sense of how much data a	01:58:15
2	book takes up?	01:58:19
3	MR. WEINSTEIN: Objection.	01:58:21
4	A. So I've seen estimates that it's a	01:58:22
5	little more than 300,000 books would fit in a	01:58:29
6	terabyte, e-books. And, of course, this is	01:58:32
7	hundreds of terabytes, so multiply that by	01:58:38
8	hundreds.	01:58:41
9	Q. In your years of research, have	01:58:41
10	you come across this amount of data either	01:58:48
11	being uploaded or downloaded via torrent	01:58:53
12	before?	01:58:57
13	MR. WEINSTEIN: Object to form.	01:58:58
14	A. I've never seen an individual	01:58:58
15	instance of an entity downloading or uploading	01:59:01
16	this much data.	01:59:05
17	Q. And again, how long have you been	01:59:06
18	working in your field?	01:59:10
19	A. I've been a computer scientist	01:59:13
20	since I started my Ph.D., which was 2004. So	01:59:18
21	we're going on 21 years now.	01:59:23
22	Q. And in terms of the data sets that	01:59:31
23	you testified regarding, and I think we marked	01:59:37
24	a few of those in Exhibit 6, do you know how	01:59:40
25	those data sets correspond to this AWS chart in	01:59:49

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1	the sense that -- withdraw that.	01:59:59
2	Are you aware whether or not this	02:00:01
3	captures all of Meta's torrenting activity?	02:00:08
4	A. I do not think this captures all	02:00:11
5	of Meta's torrenting activity, because I'm	02:00:14
6	aware of documents that indicate there was	02:00:17
7	torrenting happening outside of this period.	02:00:18
8	Q. And do you have those AWS logs or	02:00:23
9	have you seen them with respect to any	02:00:25
10	torrenting activity outside of this period?	02:00:28
11	A. I believe there's one other log	02:00:30
12	that I did not include in this analysis that	02:00:32
13	goes around three months further into the	02:00:38
14	future, starting from, I think, June 22nd. I	02:00:40
15	have not analyzed those, but it is only in 2024	02:00:45
16	that I have that data.	02:00:48
17	Q. So there could be more torrenting	02:00:49
18	activity with respect to data being uploaded	02:00:55
19	and downloaded by Meta than what is presented	02:00:58
20	in this chart as Exhibit 7?	02:01:00
21	MR. WEINSTEIN: Objection. Calls	02:01:03
22	for speculation. Scope. And leading.	02:01:05
23	A. I believe I've seen documents that	02:01:07
24	indicate that there's torrenting outside of	02:01:13
25	this period. So there would potentially be	02:01:15

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1	more evidence to produce.	02:01:18
2	Q. And is it possible to download via	02:01:20
3	torrent without uploading while you do so?	02:01:25
4	MR. WEINSTEIN: Object to form.	02:01:32
5	Scope.	02:01:34
6	A. Yes. There are ways to configure	02:01:34
7	a BitTorrent client so it does download only	02:01:36
8	and does not upload.	02:01:39
9	Q. Have you seen any evidence in this	02:01:41
10	case that that's what was done?	02:01:43
11	A. We found no evidence of that	02:01:45
12	happening in the code, and have no evidence it	02:01:47
13	was done based on the transfer logs.	02:01:53
14	MR. STEIN: I have no further	02:02:10
15	questions for the witness.	02:02:10
16	MR. WEINSTEIN: Okay. Just a	02:02:12
17	couple of them.	02:02:13
18	RE-EXAMINATION BY	02:02:15
19	MR. WEINSTEIN:	02:02:16
20	Q. Sir, if you could turn back to	02:02:16
21	Exhibit 6, which was one of the exhibits that	02:02:18
22	was provided to you by Mr. Stein.	02:02:22
23	A. Mm-hmm. I have it.	02:02:23
24	Q. Now, on the last page, you can see	02:02:28
25	that there are a number of path names listed	02:02:33

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1	that, "ia, libgen_li_fig, libgen_rs_fig."	02:02:36
2	Do you see all of those?	02:02:42
3	A. Yes.	02:02:44
4	Q. Do you know if those paths	02:02:44
5	actually ended up existing?	02:02:48
6	A. I have not been given access to	02:02:49
7	Meta infrastructure to confirm any of the	02:02:51
8	files. But what I see is a directory listing	02:02:54
9	of mount of file systems, and the way that	02:02:56
10	they're describing this is that it is a	02:03:00
11	mount/data, and one does not typically talk	02:03:09
12	about things this way unless the data is	02:03:11
13	actually there.	02:03:13
14	Q. But you don't know what's in those	02:03:14
15	other folders, correct, libgen_li_fig,	02:03:15
16	libgen_rs_fig and Scihub, you don't actually	02:03:18
17	know what's in those folders or if those	02:03:20
18	folders ever had anything, correct?	02:03:22
19	A. The document says it is torrent	02:03:24
20	files already downloaded to the data mount. So	02:03:27
21	I just take that at face value. I do not have	02:03:30
22	access to their machines to, for instance, do a	02:03:38
23	directory listing.	02:03:42
24	MR. WEINSTEIN: Why don't we take	02:03:53
25	a five-minute break to confer with my	02:03:54

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1	colleague to make sure there's no	02:03:59
2	further follow-up.	02:04:01
3	THE VIDEOGRAPHER: We're off the	02:04:02
4	record. The time is 2:03 p.m.	02:04:04
5	(Recess taken at 2:03 p.m. and	02:04:05
6	reconvening at 2:11 p.m.)	02:04:08
7	THE VIDEOGRAPHER: We are now back	02:11:35
8	on the record. The time is 2:11 p.m.	02:11:37
9	BY MR. WEINSTEIN:	02:11:42
10	Q. Welcome back, Dr. Choffnes.	02:11:42
11	A. Thank you.	02:11:45
12	Q. Before when you were being asked	02:11:48
13	by Mr. Stein you were asked a question of	02:11:50
14	whether or not measures could have been taken	02:11:53
15	to avoid or prevent upload during downloading	02:11:55
16	and whether such measures had been taken.	02:12:00
17	Do you recall that testimony?	02:12:02
18	A. I do.	02:12:03
19	Q. Do you recall having provided an	02:12:04
20	opinion on that subject in your report dated	02:12:05
21	February 26, 2025?	02:12:08
22	A. Sorry, just to refresh my memory,	02:12:10
23	which part of -- just remind me of the context	02:12:38
24	again so I don't comment on the wrong thing.	02:12:41
25	Q. The question, sir, was before when	02:12:43

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1	you were being asked by Mr. Stein to give an	02:12:45
2	opinion, a new opinion, regarding whether it	02:12:48
3	would have been possible to implement	02:12:52
4	safeguards to prevent uploading during	02:12:54
5	downloading and then whether you saw evidence	02:12:57
6	that Meta had employed such measures.	02:13:01
7	My question to you was, did you	02:13:03
8	provide opinions on that topic in your expert	02:13:04
9	report dated February 26, 2025, which is	02:13:06
10	Exhibit 1?	02:13:10
11	A. I'm seeing Paragraph 12 where I'm	02:13:10
12	talking about the uploading mechanisms that I	02:13:13
13	refer to not being tested in the EC2 networking	02:13:17
14	environment where Plaintiffs' works were	02:13:21
15	torrented. So that was one aspect of testing	02:13:23
16	whether uploading would have occurred during	02:13:26
17	the leaching phase that I commented on.	02:13:30
18	Q. Paragraph 12 is talking about the	02:13:32
19	hole-punching issue, right?	02:13:39
20	A. Also Paragraph 10. "The	02:13:41
21	BitTorrent client may initiate connections to	02:13:41
22	other leechers while the download is not	02:13:44
23	complete. While doing so, BitTorrent is	02:13:46
24	designed to provide pieces of torrent data to	02:13:47
25	those leechers (i.e., upload to them) to	02:13:50

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1	increase the chances that the peer will	02:13:51
2	continue to provide pieces for downloading."	02:13:52
3	Q. Okay. I'll ask the question more	02:13:55
4	precisely, then. Did you provide an opinion in	02:13:57
5	your opening report that measures could have	02:14:00
6	been taken to prevent or reduce uploading	02:14:02
7	during downloading? Let's start with that.	02:14:05
8	A. I comment that Frederiksen-Cross	02:14:09
9	claimed Meta had taken to prevent uploading	02:14:39
10	while downloading -- sorry, uploading, but not	02:14:41
11	-- it was sort of in general while downloading.	02:14:44
12	So hole punching is one of those techniques	02:14:46
13	that would fit the category of uploading while	02:14:49
14	downloading, in the sense of the unsolicited	02:14:51
15	inbound connections.	02:14:57
16	Q. Anywhere else?	02:14:59
17	A. Yeah, I'm trying to see if there's	02:15:07
18	any other things.	02:15:09
19	Q. I'm confused, because you said	02:15:13
20	that you saw no evidence that Meta took any	02:15:16
21	measures to prevent or reduce uploading during	02:15:18
22	downloading?	02:15:22
23	A. No, you're right. This is the --	02:15:24
24	hole punching does not fit that category of	02:15:27
25	uploading while downloading. So Paragraph 16,	02:15:29

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1	quoting Frederiksen-Cross, I say -- this is	02:15:48
2	quoting Frederiksen-Cross. "'In sum, Meta took	02:15:51
3	steps to prevent seeding data downloaded via	02:15:51
4	BitTorrent, and these steps should have	02:15:57
5	prevented any distribution of Plaintiffs' works	02:15:59
6	by Meta.'"	02:16:00
7	Then I was saying that that's not	02:16:03
8	supported by evidence, and there I'm referring	02:16:05
9	to preventing any distribution of Plaintiffs'	02:16:07
10	works by Meta, which includes uploading, which	02:16:09
11	includes uploading while downloading.	02:16:12
12	Q. Which specific statement are you	02:16:14
13	relying on for the position, if you have one,	02:16:40
14	that in your rebuttal report you provide an	02:16:42
15	opinion that measures could have been taken to	02:16:44
16	prevent upload during download that were not	02:16:47
17	taken?	02:16:51
18	MR. STEIN: Objection as to form.	02:16:52
19	A. I'm checking to see if there's	02:16:54
20	anything else in my report. I don't think I	02:17:10
21	see any language specific to that question.	02:18:24
22	Q. Okay. And then earlier in the	02:18:26
23	deposition today you testified that you had	02:18:30
24	spent approximately 40 hours on this case from	02:18:33
25	inception, correct?	02:18:35

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1	A. Correct.	02:18:36
2	Q. How many of those hours were	02:18:37
3	devoted when -- withdrawn.	02:18:40
4	How many of those hours were	02:18:44
5	devoted in the time after the service of your	02:18:47
6	expert report dated February 26th?	02:18:51
7	A. I don't have that off the top of	02:18:57
8	my head, but I can guess. I have to do some	02:19:00
9	quick math. Somewhere in the range of probably	02:19:09
10	ten to 20 hours.	02:19:15
11	Q. Okay. And how many of those hours	02:19:16
12	would have been in the last week and a half or	02:19:19
13	last two weeks?	02:19:22
14	A. It has been a blur, hasn't it.	02:19:23
15	Probably at least half of those hours.	02:19:32
16	MR. WEINSTEIN: I think with that,	02:19:37
17	I don't have any further questions for	02:19:37
18	the witness.	02:19:39
19	MR. STEIN: Okay. I think you're	02:19:41
20	all set, Dr. Choffnes. Thank you very	02:19:43
21	much.	02:19:47
22	MR. WEINSTEIN: Before we go off	02:19:47
23	the record, I will need to designate the	02:19:49
24	transcript as highly confidential	02:19:50
25	attorney eyes' only pursuant to the	02:19:52

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1	protective order with exhibits to retain	02:19:52
2	the designations.	02:19:56
3	Mr. Stein, I want to obviously put	02:19:57
4	our objection on the record that we	02:19:59
5	think the redirect examination by	02:20:00
6	Plaintiffs was improper, a violation of	02:20:02
7	the scope of the examination that we	02:20:05
8	conducted beyond the scope of that, as	02:20:09
9	well as a violation of the Court's order	02:20:11
10	regarding introduction of new expert	02:20:15
11	testimony without leave of Court. I	02:20:16
12	just want to make sure that objection is	02:20:18
13	on the record.	02:20:20
14	MR. STEIN: Okay. And for the	02:20:21
15	reasons I stated prior, I disagree with	02:20:22
16	that, but I appreciate you raising that	02:20:24
17	on the record.	02:20:26
18	I also want to object to the	02:20:28
19	designation of the entire transcript as	02:20:32
20	highly confidential pursuant to prior	02:20:33
21	statements from the Court that we should	02:20:38
22	be a little bit more limited and	02:20:39
23	conscientious with respect to how we	02:20:45
24	designate in this case.	02:20:47
25	MR. WEINSTEIN: We can go off the	02:20:48

1	record and discuss that if you like in	02:20:49
2	connection with your upcoming filing.	02:20:50
3	MR. STEIN: Thank you, Counsel.	02:20:52
4	THE VIDEOGRAPHER: This concludes	02:20:53
5	today's deposition, we're going off the	02:20:55
6	record at 2:20 p.m. The total run time	02:20:56
7	of media used was three hours 16 minutes	02:20:59
8	and will be retained by Veritext.	02:21:01
9	COURT REPORTER: Counsel, your	02:21:04
10	delivery schedule for the final is still	02:21:25
11	Monday?	02:21:27
12	MR. WEINSTEIN: For us, I think	02:21:28
13	so, yes.	02:21:30
14	MR. STEIN: We're okay with that	02:21:31
15	as well.	02:21:32
16	MR. MORTON: Are we going to get a	02:21:34
17	rough?	02:21:35
18	COURT REPORTER: Yes.	02:21:36
19	MR. STEIN: Yes. Would you mind	02:21:36
20	sending the rough to me as well.	02:21:38
21	(Whereupon the deposition	02:21:41
22	concluded at 2:20 p.m.)	02:21:42
23		
24		
25		

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1   E R R A T A

2

3   I, DAVID R. CHOFFNES, Ph.D., do hereby

4   certify that I have read the foregoing

5   transcript of my testimony, and further

6   certify that it is a true and accurate

7   record of my testimony (with the exception

8   of the corrections listed below):

9   Page   Line   Correction

10

11

12

13

14

15

16

17   _

18   Signed under the pains and penalties of

19   perjury this   day of   ,

20   2024.

21

22

23   DAVID R. CHOFFNES, Ph.D.

24

25

                                        Page 151

1   C E R T I F I C A T E

2

3   I, Michael O'Connor, Registered

4   Merit Reporter/Certified Realtime Reporter,

5   do hereby certify:

6   That DAVID R. CHOFFNES, Ph.D., the

7   witness whose testimony is hereinbefore set

8   forth, was duly sworn by me and that such

9   testimony is a true and accurate record of

10   my stenotype notes taken in the foregoing

11   matter to the best of my knowledge, skill

12   and ability.

13   IN WITNESS WHEREOF, I have hereunto

14   set my hand and Notarial Seal this 30th day

15   of March 2025.

16

17

18   _Michael O'Connor_

19   MICHAEL O'CONNOR, RMR, CRR, CRC

20   Notary Public

21

22

23   My Commission expires:

24   November 9, 2029

25

                                        Page 152

1   MARK WEINSTEIN, ESQ.

2   mweinstein@cooley.com

3   March 30, 2025

4   RE: Kadrey, Richard Et Al v. Meta Platforms, Inc.

5   3/28/2025, David Choffnes, Ph.D., (#7281431).

6   The above-referenced transcript has been

7   completed by Veritext Legal Solutions and

8   review of the transcript is being handled as follows:

9   __ Per CA State Code (CCP 2025.520 (a)-(e)) – Contact Veritext

10   to schedule a time to review the original transcript at

11   a Veritext office.

12 __ Per CA State Code (CCP 2025.520 (a)-(e)) – Locked .PDF

13   Transcript - The witness should review the transcript and

14   make any necessary corrections on the errata pages included

15   below, notating the page and line number of the corrections.

16   The witness should then sign and date the errata and penalty

17   of perjury pages and return the completed pages to all

18   appearing counsel within the period of time determined at

19   the deposition or provided by the Code of Civil Procedure.

20   Contact Veritext when the sealed original is required.

21 __ Waiving the CA Code of Civil Procedure per Stipulation of

22   Counsel - Original transcript to be released for signature

23   as determined at the deposition.

24 __ Signature Waived – Reading & Signature was waived at the

25   time of the deposition.

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1   __ Federal R&S Requested (FRCP 30(e)(1)(B)) – Locked .PDF

2   Transcript - The witness should review the transcript and

3   make any necessary corrections on the errata pages included

4   below, notating the page and line number of the corrections.

5   The witness should then sign and date the errata and penalty

6   of perjury pages and return the completed pages to all

7   appearing counsel within the period of time determined at

8   the deposition or provided by the Federal Rules.

9   _X_Federal R&S Not Requested - Reading & Signature was not

10   requested before the completion of the deposition.

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[& - 3/28/2025]

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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

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documents as submitted by the court reporter and/or

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